# Bypass Ratio: The US Air Force and Light-Attack Aviation

BY

LTCOL CALEB M NIMMO

A THESIS PROVIDED TO THE FACULTY OF

THE SCHOOL OF ADVANCED AIR AND SPACE STUDIES

FOR COMPLETION OF GRADUATION REQUIREMENTS

SCHOOL OF ADVANCED AIR AND SPACE STUDIES

AIR UNIVERSITY

MAXWELL AIR FORCE BASE, ALABAMA

JUNE 2013

# Report Documentation Page

*Form Approved*
*OMB No. 0704-0188*



| 1. REPORT DATE | 2. REPORT TYPE | 3. DATES COVERED |
|---|---|---|
| **JUN 2013** | | |

| 4. TITLE AND SUBTITLE | 5a. CONTRACT NUMBER |
|---|---|
| **Bypass Ratio: The US Air Force and Light-Attack Aviation** | 5b. GRANT NUMBER |
| | 5c. PROGRAM ELEMENT NUMBER |
| 6. AUTHOR(S) | 5d. PROJECT NUMBER |
| | 5e. TASK NUMBER |
| | 5f. WORK UNIT NUMBER |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **School Of Advanced Air And Space Studies,,Air University,,Maxwell Air Force Base,,AL,** | 8. PERFORMING ORGANIZATION REPORT NUMBER |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) | 10. SPONSOR/MONITOR'S ACRONYM(S) |
| | 11. SPONSOR/MONITOR'S REPORT NUMBER(S) |

12. DISTRIBUTION/AVAILABILITY STATEMENT
**Approved for public release; distribution unlimited.**

13. SUPPLEMENTARY NOTES
**The original document contains color images.**

14. ABSTRACT
**The current budget considerations have driven the Air Force into a self-proclaimed simplification model for mission sets ???trading size for quality.??? Specifically, it is touting the following four mission sets as essential: Air and Space Control, Global Intelligence, Surveillance, and Reconnaissance (ISR), Rapid Global Mobility, and Global Strike. Similarly, it has established high-priority modernization acquisition programs such as the Joint Strike Fighter (JSF), the Long Range Strike Bomber, the KC-46 refueling tanker, and Space-Based ISR. While there is no question about the importance of these mission sets, the all-or-nothing rhetoric, which excludes the fielding of light-attack and light-mobility aircraft, will carry strategic costs in future operations within the Asia-Pacific region.**

15. SUBJECT TERMS

| 16. SECURITY CLASSIFICATION OF: | | | 17. LIMITATION OF ABSTRACT | 18. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON |
|---|---|---|---|---|---|
| a. REPORT | b. ABSTRACT | c. THIS PAGE | | | |
| **unclassified** | **unclassified** | **unclassified** | | **111** | |

APPROVAL

The undersigned certify that this thesis meets master's-level standards of research, argumentation, and expression.

_____

Dr. Stephen Chiabotti 2 June 2013

_____

Dr. James Kiras 2 June 2013

DISCLAIMER

The conclusions and opinions expressed in this document are those of the author. They do not reflect the official position of the US Government, Department of Defense, the United States Air Force, or Air University.

## ABOUT THE AUTHOR

Lt Col Nimmo was born in Oklahoma City, OK. He entered the Air Force in June 1999 as a graduate of the U.S. Air Force Academy. LtCol Nimmo is an instructor pilot in fixed wing, rotary wing, and tiltrotor powered-lift aircraft. He has held numerous operational positions including an attack helicopter exchange with the USMC. Prior to his current position, he was the Director of Operations for the 438th Air Expeditionary Advisory Squadron, flying the Mi-35 Hind as an evaluator pilot with Czech, Hungarian, and Afghan pilots. Additionally, LtCol Nimmo worked side-by-side with Department of State Foreign Service Officers. As a Fellow for the CSAF's Political Advisor, he deployed with the US Embassy in Sarajevo, Bosnia. He has a bachelor's degree in Engineering from the United States Air Force Academy, a master's degree in Business Administration from Embry Riddle Aeronautical University, and a master's degree in Military Operational Art and Science from Air Command and Staff College.

ACKNOWLEDGMENTS

I would like to thank God, my wife, Dr. Stephen Chiabotti, and Dr. James Kiras. You are appreciated.

ABSTRACT

The current budget considerations have driven the Air Force into a self-proclaimed simplification model for mission sets "trading size for quality." Specifically, it is touting the following four mission sets as essential: Air and Space Control, Global Intelligence, Surveillance, and Reconnaissance (ISR), Rapid Global Mobility, and Global Strike. Similarly, it has established high-priority modernization acquisition programs such as the Joint Strike Fighter (JSF), the Long Range Strike Bomber, the KC-46 refueling tanker, and Space-Based ISR. While there is no question about the importance of these mission sets, the all-or-nothing rhetoric, which excludes the fielding of light-attack and light-mobility aircraft, will carry strategic costs in future operations within the Asia-Pacific region.

First, a general Defense strategy will be summarized to examine current and future military obligations in support of national security. Second, I will highlight significant historical events in Light Attack platforms for trends of mission effectiveness and lessons learned. Third, I will detail the modern operational need for light-attack aircraft. Fourth, I will analyze the current security issues in the Asia-Pacific region to see where light-attack mission sets are highly relevant, and I will package the optimal technology, organization, and training structure for successful implementation. Finally, I will evaluate why the United States can and should incorporate Light Attack options in the Asia Pacific region to increase security through global presence and international partnerships. The study will consider platforms, organizations, training, operations, and people as equally important. For example, the career progression of aviators involved in training allies in light-attack aviation is as important to the success of the endeavor as the specialized airplane flown. Similarly, the organizational setting of light attack has much to do with its operational focus and the success of its practitioners.

CONTENTS

## Chapter 1

## Introduction

> *The significant problems we face cannot be solved at the same level of thinking we were at when we created them.*
>
> *Albert Einstein*

The Air Force has a decision to make regarding light-attack aviation and the potential it has to build partnership with potential allies. Light-attack aircraft are usually propeller-driven, whether powered by a turbine or piston engine. The Air Force tends to prefer turbo-jets or turbo-fans without props to power its aircraft. The jets and fans tend to perform better at high altitude and high speed, both regimes of comfort for the flying service. Nonetheless, a good deal of air warfare in the past sixty years has occurred at relatively low speeds and somewhat close to the ground, both regions of discomfort for the Air Force. Yet, partnering presents opportunities to build relationships and curry influence around the world. Will the Air Force bypass this opportunity and throttle ahead under an old paradigm? The bypass ratio alluded to in the title concerns the decision to choose between performance characteristics in a turbine engine. A high bypass ratio allows most of the air to flow around the combustion chamber in Fig 1. This design is good for aircraft flying at low speeds and low altitudes. In theory, an airplane with a propeller has an infinite bypass ratio. A low bypass ratio sends all the air through the combustion chamber in Fig 2. This design is good for high-speed high-altitude flights. The design chosen should match the primary regime in

which the aircraft flies. Similarly, the Air Force must create a fleet which matches the primary regimes for which it expects to operate.

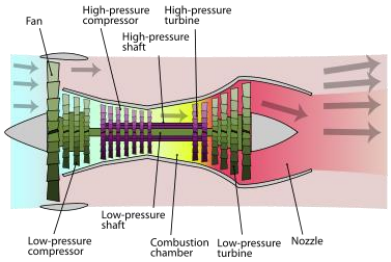


Fig 1 Bypass Ratio

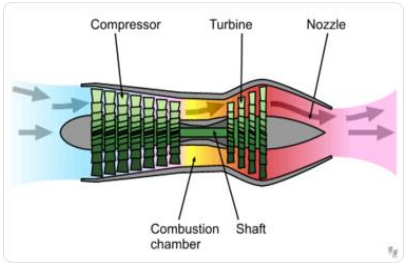


Fig 2 Bypass Ratio

http://en.wikipedia.org/wiki/Bypass_ratio

The recent wars in Afghanistan and Iraq have taught new lessons to the Department of Defense and more specifically the United States Air Force. After the September 11 terrorist attacks on the World Trade Center Towers and Pentagon, the US entered an irregular war, for which it was not ideally organized, trained, or equipped to fight. Broadly speaking, planners at the Pentagon believed high-tech, 4th-generation aircraft could fill the gap in asymmetric warfare even if they represented overkill in resources expended. This proved to be a costly decision as time logged on 4th-generation fighters and bomber airframes/engines in addition to fuel and maintenance costs mounted without an apparent solution to the problem. Additionally, pilots of these platforms had to focus primarily on mission sets like CAS, and their other high-threat skills such as Offensive Counter-Air (OCA), Nuclear Deterrence, and Suppression of Enemy Air Defenses (SEAD) atrophied with time.

The disconnect between the war planned and the war fought is nothing new. The US has a trend of using analogies from past wars to prepare for the future.[1] The Korean and Vietnam Wars were fought with tactics and equipment developed for the Soviet Union in state-on-state, high-intensity conflict. The US Air Force was born in total war, so its purpose and ideal mode of operation evolved from the early thinking of Giulio Douhet.

The "Bomber will always get through" defined early air-minded theorists.[2] This philosophy reigned during the interwar period with investments in bomber technology and largely shaped how the Air Force viewed itself. In an attempt to define itself as a new service, the Air Force advertised quick wars. These wars would be won from the air with decreased costs in national blood and treasure compared to the trench warfare of WWI. Air Forces could use the indirect approach to fly over enemy forces and penetrate deep into enemy territory to strike an enemy center of gravity.[3] Whenever Airmen did not achieve the results they predicted from air power, they turned to technology to fill the void. Technology became the dominant molecule in the DNA of Air Force personnel. Light attack aviation was a mutant in this gene pool. It

---

[1] Yuen F. Khong, *Analogies at War: Korea, Munich, Dien Bien Phu, and the Vietnam Decisions of* (Princeton, NJ: Princeton University Press, 1992)
[2] Giulio Douhet, *The Command of the Air* (Tuscaloosa, AL: University of Alabama Press, 2009)
[3] B.H. Liddell Hart, *Strategy,* rev. ed. (London: Penguin Press, 1991)

smacked too much of supporting the army in its slogging match with enemy forces.

In *The Structure of Scientific Revolutions*, Thomas Kuhn refers to paradigms and revolutions.[4] The normal state of organizations is rigid and stagnant. This allows for stability, predictability, and bureaucratization. If an organization has clearly defined roles and norms, it can more efficiently work, performing the daily labor for what it considers important. In order to change a paradigm, there must be anomalies to force a revolution, as well as an alternative paradigm. Revolution is a historically painful process.

However, the longer one associates with an older paradigm the harder it is to have a new vision. This is especially true when one's loyalties and promotion opportunities lie within the old school. On the contrary, Kuhn also argues that a paradigm should not be too easily surrendered by the old regime. This ensures that the organization is "not easily distracted and that anomalies that lead to paradigm change will penetrate existing knowledge to the core."[5] If a new paradigm must be born from crisis, what kind of crisis could cause the Air Force to rethink its stance on the necessity of light attack platforms and the mission sets associated with light attack aircraft? The first possible element is money.

---

[4] Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago, IL: University of Chicago Press, 1962)
[5] Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago, IL: University of Chicago Press, 1962), 22.

Today, the fiscal position of the United States is bleak. Former DOD Secretary Leon Panetta and Army Gen. Martin E. Dempsey, Chairman of the Joint Chiefs of Staff, stressed that unless Congress acts, the nation's military readiness will be compromised. The United States has a number of adversaries around the world, Panetta said, "but the most immediate threat to our ability to achieve our mission is fiscal uncertainty: not knowing what our budget will be; not knowing if our budget will be drastically cut; and not knowing whether the strategy that we put in place can survive."[6] The second ingredient for paradigm shift is a changing demography for the nation's highest and most probable threats.

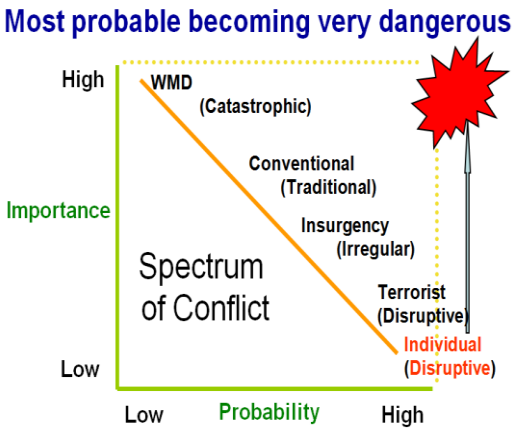


Fig 3 Michael V. Smith, Blue Horizons II: Future Capabilities and Technologies for 2030 (Maxwell AFB, AL: Air University, 2013)

[6] Karen Parrish, "Panetta: Fiscal Crisis Poses Biggest Immediate Threat to DOD," American Forces Press Service, 10 January 2013,http://www.defense.gov/news/newsarticle.aspx?id=118974 (accessed 19 May 2013).

> Warfare, which has until now stayed fixed to the orange line in the graph above, where conflicts of high importance such as World Wars I and II were low probability events, and events of high probability were typically nuisance-level issues; has changed. We are entering an era where empowered individuals, with high probability, can produce events of high consequence, pushing us into the upper right corner of this chart, to a place we have never been before. This fundamentally changes future warfare in ways that are difficult for most to comprehend.[7]

Irregular forces are also gaining greater access to advanced weaponry. As they do, they are increasingly capable of presenting serious threats to U.S. military operations at levels hitherto reserved for state adversaries. These, too, threaten to turn the U.S. military's forward bases and other key infrastructure into perishable assets.

If the United States fights somebody, it is going to try to project a large force compared to its enemy. Nobody has flown against the US using similar or even compatible air capabilities in decades. American strategic planners tend to focus on the start of conflict without consideration for how to secure the following peace. Military strategists have trouble accessing the peace space and then programming for it. The gap between the comparatively short-term view of the Department of Defense and the long-term view of the State Department demonstrates the difference in philosophy between the two organizations.

The DOD tends to look harder at short-term results such as taking ground, while the diplomats of the DOS take a longer view such as the

---

[7] Michael V. Smith, *Blue Horizons II: Future Capabilities and Technologies for 2030* (Maxwell AFB, AL: Air University, 2013)

implications of taking said ground during the rebuilding process of a failed state over the next generation. Recently, the DOD has tried to bridge this gap through Building Partnership Capacity (BPC) and Security Force Assistance (SFA) by conventional forces that do not typically do these kinds of missions.

Traditionally, special operations forces concentrate on SFA. The benefit to having one organization continually looking at missions such as BPC and Foreign Internal Defense (FID) is increased synergy among the diplomatic, informational, military, and economic instruments of national power. The DOD topples countries and the DOS rebuilds them. There is a ditch between these entities where quagmires develop, because SOF forces do not have the capacity to fill all the requirements for SFA. US troops handing out aid in the morning and shooting in the afternoon send confusing signals to the local populace and the international community. Similarly, if US foreign policy says one thing and its military posture shows another, the nation's credibility is compromised.

The US often has a very smart and capable Secretary of Defense and Secretary of State but no Secretary of the abyss in between. During OIF, the transition time between "Mission Accomplished" to counterinsurgency was six months. There was no vessel in place to translate the follow-on diplomatic will of US foreign policy into action. Pentagon long-range planners had thought about the future within the context of war without regard for the space between war and peace.

The current vogue theory for the high side of the warfare spectrum of conflict is Anti Access Area Denial (A2AD) and AirSea Battle. This theory correlates with the pivot in emphasis to the Asia-Pacific region and the relative decrease in spending cuts for the Air Force and Navy projected by Secretary of State Clinton and Secretary Panetta.[8] Whether it is accurate or not, the rhetoric associated with this theory helps justify the money needed for big programs such as the F-35. Additionally, the Air Force secures money to extend the lifetime of the 4th-generation aircraft fighting today's wars until the F-35 is completely online.

US services need a peer opponent in order to legitimize big-program spending such as the F-35. In a world without a sovereign, public officials can argue that even if a country is not currently aggressive, there is no guarantee it will not become aggressive in the future. This allows military decision-makers to worry about the most implausible threats. When two countries take this approach, they compound a "security dilemma" where each tries to outspend the other in an escalating arms race.[9]

China appears to some planners as the "threat du jour" now that the US can politically withdraw from Afghanistan. The armed services can return to building the forces they want to build and buying the

---

[8] Mackenzie Eaglen, *What's Likely in New Pentagon Strategy: 2 Theaters, Fewer Bases, A2AD*, Breaking Defense, 20 December 2011, http://defense.aol.com/2011/12/20/whats-likely-in-new-pentagon-strategy-2-theaters-fewer-bases/ (accessed 19 May 2013).
[9] Robert Jervis, *Perception and Misperception in International Politics* (Princeton, NJ: Princeton University Press, 1976), 66.

technological equipment they prefer to buy. The need to build a force that focuses on Military Operations Other Than War will not and probably should not arise from within the services at present. However, if US strategists and planners know the nation will continue to engage in these kinds of operations for the foreseeable future, it is logical to attribute a portion of its warriors, diplomats, and respective assets to these ends.

How can the United States incorporate light attack options in the Asia Pacific region to increase security, and why should it even try? Is BPC in the best interest of national security, and what is the USAF willing to pay for an in-country aviation representation? If the Air Force believes it can muddle through this kind of war and host-nation engagement with its high-tech assets, it will not make investments in light-attack aircraft. Therefore, high-end aircraft will be the only future option. These aircraft operate at costs that dwarf those of light-attack units. This cost disparity is a lure for anyone who means to level the playing field with a super power through guerrilla tactics or by sponsoring proxy wars.

The Air Force may have to look at using high-tech operational systems with cost-effective, low-tech assets if it wishes to close the seam between diplomatic foreign policy, allied security cooperation, and sustainable global military presence. Additionally, the people who

operate these systems must have buy-in to the interagency and the long view of diplomats in the DoS and its allied foreign partners.

This paper will evaluate why the Air Force should develop and incorporate a modern light-attack capability. First, a proposed Defense strategy will be summarized to examine current and future military obligations in support of national security. Second, the study will highlight significant historical events in light-attack platforms for trends of mission effectiveness and lessons-learned. Third, it will detail the modern operational need for light-attack aircraft. Fourth, it will analyze the current security issues around the globe to see where light-attack mission sets are highly relevant, and then package the optimal technology, organization, and training structure for successful implementation. Finally, it will evaluate whether light-attack aircraft can fill the gap between agencies in bolstering American security.

## Chapter 2

## Strategy

The purpose of this section is to lay out an optimal Air Force strategy for today and the foreseeable future. If light-attack aircraft are important, they must fit within a pragmatic strategy which maximizes national security under real-world considerations. The Center for Strategic and Budgetary Assessments created *An Air Force Strategy for the Long Haul*, an airpower strategy document written in 2009 by Dr. Thomas Erhard. This paper will use this strategic model as a baseline for further exploration.

Dr. Erhard's strategy begins with three assumptions. First, Islamist radicalism is a major concern today and will continue to be so for the foreseeable future. Second, the US will need to hedge against the rise of an openly confrontational China and challenges accrued by authoritarian capitalist states. Third, the US must prepare for a world in which there are more nuclear-armed regional powers.[1] Crafting a strong strategy with these assumptions in mind will ensure a better future. This strategy harmonizes ends, ways, and means, and is grounded by historical trends and current environmental threats. Such a strategy is persuasive enough to compel leaders to commit time and resources to a common purpose, overcoming parochial desires.

---

[1] Thomas P. Erhard, *An Air Force Strategy for the Long Haul* (Washington, DC: Center for Strategic and Budgetary Assessments, 2009)

Erhard's work begins by assessing the current state of the United States Air Force. The work is dually concerned with how forces can better align their institutional identity and posture for the future security environment. Under a fiscally constrained budget, the Air Force will require options for realignment over the next two decades. Dr. Erhard contends the DOD organizes, trains, and equips the services using an incremental mechanism entrenched during the Cold War. In order for the Air Force to match its means to the national ends, it must break with the old ways of thinking.[2]

Erhard examines the force structure after a brief review of the command, planning, and decision-making apparatus of the Air Force. Three budgetary pitfalls are identified. The first is aging assets, which require a great deal of time and resources to maintain. Aircraft parts are harder to find, while the old technology becomes obsolete. The second pitfall discussed is diminished foreign basing and excessive domestic base structure. The Defense Base Closure and Realignment Commission (BRAC) mandated by Congress is responsible for making recommendations which optimize base activity and its impact on the environment. Local and state politics can keep a base open even if it is economically unproductive. The rising costs of fuel and healthcare are discussed last as severe monetary constraints which are unlikely to

[2] Thomas P. Erhard, *An Air Force Strategy for the Long Haul* (Washington, DC: Center for Strategic and Budgetary Assessments, 2009), 5.

decrease. Large numbers of personnel and gas-guzzling equipment tax defense expenditures. The ability to modernize the services is hampered by bureaucratic decisions and organizational philosophies of the past.[3]

The future security environment is analyzed and pinpoints extremist terrorist groups as a growing concern. This concern is magnified by the increase in nuclear proliferation. While another state actor may be deterred using a policy of mutually-assured destruction (MAD), a non-state actor is not necessarily deterred in the same fashion. This is especially true for individuals who feel an existential threat to their way of life. Additionally, the lack of attribution in a terrorist attack might be an attractive proxy option for a state actor to give them a degree of plausible deniability.

At the other end of the spectrum, China poses a threat and concern to the US as its closest peer in the Pacific. China's military has pursued anti-access/area denial capabilities. Additionally, it is throwing its weight around in international airspace, international waters, space, and cyberspace. These actions can be destabilizing for the region, and this conduct can affect global commerce. Such disruption and destabilization in turn can have large impacts on the US diplomatic and economic instruments of national power. The US must be able to move

[3] Thomas P. Erhard, *An Air Force Strategy for the Long Haul* (Washington, DC: Center for Strategic and Budgetary Assessments, 2009), 19.

freely in the global commons, and it should fight to ensure the same for its local allies, who can balance the Chinese influence in the region.[4]

Erhard then offers three prescriptions to reduce the "middle weight" forces and improve airpower capabilities at the low and high ends of the spectrum of conflict. The first prescription is to reinvigorate and reestablish the Air Force within defense policy debate. The Air Force has fared poorly in flag-officer positions on the joint staff and has been unable to communicate its position to the joint community. Second, he recommends the service change its force structure and platform plans. The current platforms carry a legacy from the Cold War. Third he recommends a reevaluation of BRAC issues.[5]

For the first prescription, the Air Force has to conduct a business process reorganization (BPR) on research and development in concert with its acquisition processes. Additionally, the nuclear expertise must be reestablished to increase the level of prestige and proficiency in the community. The Air Force has to be able to tell its story to the other services and members of the interagency, and investments in officer developmental education are paramount and prerequisite to long-term, enduring change.

---

[4] Thomas P. Erhard, *An Air Force Strategy for the Long Haul* (Washington, DC: Center for Strategic and Budgetary Assessments, 2009), 35.
[5] Thomas P. Erhard, *An Air Force Strategy for the Long Haul* (Washington, DC: Center for Strategic and Budgetary Assessments, 2009), 44.

Erhard contends Air Force leaders should look beyond air and space niche missions. Specifically, he suggests the Air Force can lead major innovation leaps in the following mission areas: "high-end, asymmetric warfare; irregular warfare; counter-proliferation; and homeland defense."[6] Furthermore, this strategy supports investments in such initiatives as KC-X tanker modernization, the Next-Generation Bomber (NGB), stealthy Remotely Piloted Aircraft (RPA), and light, armed-reconnaissance, short-takeoff, and light-airlift aircraft.

The strategy suggests KC-X tanker modernization must be sustained and updated to support high-end warfare in the Pacific. With anti-access concerns near the Asian borders, the local air and sea base operations will be held at risk. Likewise, an aging tanker fleet, shrinking overseas basing options, and the rising need for extremely long-range air operations in contested high-end warfare present a compelling case for tanker modernization.[7]

Similarly, the Next-Generation Bomber (NGB) could serve as the Air Force flagship for long-range bomber operations in anti-access areas. The NGB, now known as the Long-Range Strike Bomber (LRSB), constitutes high-end surveillance and strike capability. The CSBA report

---

[6] Thomas P. Erhard, *An Air Force Strategy for the Long Haul* (Washington, DC: Center for Strategic and Budgetary Assessments, 2009), 57.
[7] Thomas P. Erhard, *An Air Force Strategy for the Long Haul* (Washington, DC: Center for Strategic and Budgetary Assessments, 2009), 63.

suggests production of twelve aircraft per year from 2018 through 2027.[8] Five block upgrades are proposed, and the last four would be unmanned designs. The current budget constraints emphasize the dual nature of strike and surveillance.

Next, Erhard suggests the Air Force should field a more multi-dimensional ISR force able to study a variety of mobile targets ranging from individuals to high-end systems in denied areas. A tiered approach would allow cheaper variants at the low-tech level where air superiority is assured. Additionally, larger stealthy variants, such as an unmanned B-3, could be used to penetrate deep into high-threat regimes. Best practices from the current MQ-9 fleet should be used to build a tiered cadre of RPAs which can operate across the spectrum of conflict, while maximizing efficiency and cost considerations.[9]

Last, the report suggests the Air Force is not aligned to address current and future threats, as it operates with aircraft designed for major combat operations. If the service wishes to accomplish irregular warfare tasks, it does so at an unsustainable cost in fuel and accelerated airframe wear. The Air Force is building a "middle-weight" force structure. The organization and its assets are much too complex and

---

[8] Thomas P. Erhard, *An Air Force Strategy for the Long Haul* (Washington, DC: Center for Strategic and Budgetary Assessments, 2009), 70.
[9] Thomas P. Erhard, An Air Force Strategy for the Long Haul (Washington DC: Center for Strategic and Budgetary Assessments, 2009), 69.

expensive for low-end or irregular conflicts, while simultaneously lacking needed capabilities to confront problems at the high-end. For example, the F-35 lacks the range needed to meet high-end challenges, while it is over-specified and overpriced for low-end challenges. Therefore, this strategy promotes an Air Force which expands its irregular war forces to include armed reconnaissance and short-takeoff, light airlift aircraft. Erhard justifies the previous evaluations and makes further recommendations in the following excerpt:

> Given the range of future operational challenges, emerging threats employing anti-access/area-denial capabilities will likely force an evolution away from massed operations involving short-range, multi-role fighter-bombers. Indeed, at some point over the next two decades, short-range, non-stealthy strike aircraft will likely have lost any meaningful deterrent and operational value as anti-access/area denial systems proliferate. They will also face major limitations in both irregular warfare and operations against nuclear-armed regional adversaries due to the increasing threat to forward air bases and the proliferation of modern air defenses. At the same time, such systems will remain over-designed—and far too expensive to operate-for low-end threats. In short, the so-called tactical-air shortfall or fighter gap is only a problem if one believes that the legacy force fighter-bomber structure replacement is affordable; and (2) its utility will endure in the future security environment. Stealthy air superiority craft—even those with relatively short range, such as the F-22-may retain significant utility over the next twenty years, however, particularly in the near term, given the proliferation of sophisticated air defense systems, there is a strong case for reducing the total F-35A procurement. The Air Force should consider cutting its planned buy to free up resources for other higher-priority requirements. Reducing the Air Force plan to buy 1,763 F-35As through 2034 by just over half, to 858 F-35As, and increasing the procurement rate to end in 2020 would be a prudent alternative. This would provide 540 combat-coded F-35As on the ramp, or thirty squadrons of F-35s by 2021 in time to allow the Air Force budget to absorb other program ramp-ups like NGB. This plan provides for a much more stealthy and survivable force across its total range of capabilities. From a force

> that in 2009 has low-observable or stealthy platforms in only 5 percent of its fighter force, 20 percent of its bomber force, and none of its ISR force, this plan results in a 2028 Air Force with low-observable platforms in 50 percent of its fighter force, over 20 percent of its bomber force, and over 50 percent of its ISR force. Substantial force structure additions in the form of light aircraft and UAVs make this Air Force much more useful and sustainable in protracted, distributed irregular warfare environments.[10]

This strategy is symbolized by an inverted barbell. The Air Force should invest heavy on the high side. Nuclear deterrence, air superiority, global strike and global reach allow the military to hold any target on the globe at risk against peer state actors addressing total political aims. Reduce investments in the middle. Conventional major combat operations conducted by expensive middle-weight assets should be streamlined to allow a tailored response with an option to escalate. The Air Force should also invest heavy on the low side. Irregular warfare has become a staple for enemies who do not wish to compete directly with a dominant US conventional force. Engagement can help to prevent a state from failing which could lead to expensive mobilizations. Additionally, investment in sustainable low-tech assets can allow for long-term presence in areas which are important to the US for stability and power balancing.

While some conditions have changed since 2009, this strategy represents a good starting point which assigns specific responsibility to

[10] Thomas P. Erhard, An Air Force Strategy for the Long Haul (Washington DC: Center for Strategic and Budgetary Assessments, 2009), xiv.

light-attack aircraft under a broad Air Force policy. The entire spectrum of conflict is accommodated with emphasis on return for investment and national security. One should, however, review a century of airpower history to see where the Air Force has benefited from light-attack aircraft. Successful employment of light-attack aircraft by Forward Air Controllers (FAC) in WWII to air advisors Building Partnership Capacity (BPC) in OEF may indeed highlight important considerations relevant to future military planners.

As BPC is a long-term mission, success requires a stable organization with staying power in order to prevent the Phoenix cycle. The closest any author has come to defining the Phoenix cycle is George Monroe. Monroe's analysis appeared in an article published in February 2008. Monroe, a retired Air Force colonel working on irregular warfare issues in the Pentagon, characterizes the Phoenix cycle:

> 1) The president directs the services to create specialized forces in response to an emerging crisis;
>
> 2) Creation of these forces requires major changes to service organizations;
>
> 3) The services resist organizational change, address crisis with conventional
> forces, operational results prove unsatisfactory;
>
> 4) The president orders the services to create specialized forces;
>
> 5) The services comply by scrambling to recreate former capability within a small part of their force, which results in more effective results;
>
> 6) The crisis demanding the special forces ends;

7) The services declare the need a one-time event;

8) The services disband the capability and forget the lessons learned; and

9) The cycle begins anew when another crisis arises.[11]

[11] George M. Monroe, "The Rebirth of the Outback Air Force," *Armed Forces Journal* Feb 08: http://www.armedforcesjournal.com/2008/02/3246746 (accessed 15 May 2013)

## Chapter 3

## Legacy

To understand the light-attack legacy, one must first understand the difference between utility and value. For example, a common pickup truck has certain operating specifications to include horsepower, speed, 4WD, power windows, and a bed. These features provide the owner with utility in the performance of the truck. The value of the truck comes from the empty space in the bed.

That empty space is filled by the owner's needs and is peculiar to her. In this light, it is important that the need drives the selection of the truck and not the opposite. If one only had small trucks, he or she could not tow or haul large loads. If one only had large trucks, he or she could not fit in to small spaces, and the gas bill would be excessive for small jobs. One truck is not intrinsically better than another, but it is the particular need which should determine truck selection.

Ideally, the same logic would hold for the Air Force's choice of weapon systems and pilot training. Initially the airplane was closely tied to the ground. This was before the reorganization of national security elements in 1947, and after this time air-minded people have attempted to find organically strategic mission sets for the Air Force. At first, this search for strategic purpose attached to the need for service independence. As time passed, it became part of the internal mantra of airmen who sought to find ways air power could be decisive in warfare.

Light-attack aircraft are traditionally supporting, verses supported, assets. In the Civil War, balloons directed artillery fire and conducted ISR. By World War I, light aircraft were guiding artillery and dropping bombs on and near the battlefield. Forward air controllers (FAC) would become one of the most important mission elements for rationalizing light-attack aircraft. During World War II, FACs would search for targets in small aircraft such as the Navy Vought Kingfisher. They would fly their aircraft beneath low cloud decks to look for targets of opportunity on the ground. When the FAC found a worthwhile target, he would fly up through the clouds to meet up with bomber and strike aircraft and lead them to the target.[1]

Once air superiority was achieved, light attack aircraft could focus their complete attention on the air-to-ground war. This evolved into the armed reconnaissance mission. Light-attack aircraft would search for targets and then call in fighter bombers to take out the targets. The time between sighting, to requesting fighter-bombers from headquarters, to dropping ordnance, proved too long, and targets would disappear into the mountainside. In response, pilots became airborne controllers under the callsign of Horsefly.

Fighter-bomber units were directed to make the armed recce missions first priority even before they launched. In this case, the light-attack aircraft would spot a target and coordinate directly with fighter-

[1] Jan Churchill, *Hit My Smoke: Forward Air Controllers in Southeast Asia* (Manhattan, KS: Sunflower University Press, 1997), 2.

bombers over VHF radio to coordinate an attack. The Horseflies were painted silver while artillery spotting aircraft were painted olive drab. The Horseflies were so effective that the Germans stopped shooting at silver aircraft, because they knew those aircraft would bring fighters on top of their positions if they engaged.

Airborne pilots could direct as many as 100 artillery guns. This caused the Germans to severely limit their movement during the daytime, so they would not give up their positions. The light-attack aircraft could effectively direct more firepower from artillery than that delivered by a whole squadron of B-17s. By 1950, the lessons learned from these air-to-ground evolutions were encapsulated in the Joint Training Directive for Air-Ground Operations which would be used by the Mosquitos in the Korean War. [2]

Mosquito was the callsign carried by the FACs of the Korean War. The Mosquito pilots played a much greater role in tactical air control than did the Horseflies of WWII. Tactical Air Control Parties (TACP) and Air Liaison Officers (ALO) were imbedded with ground commanders and could advise them on the capabilities available. Mosquitos could maintain three hours on station over the friendly ground units while they directed F-80 Shooting Stars against the enemy lines, conducted battle damage assessment (BDA), and marked enemy positions for intelligence reports to ground commanders. The Mosquitos transitioned to T-6

[2] Jan Churchill, Hit My Smoke: Forward Air Controllers in Southeast Asia (Manhattan: Sunflower University Press, 1997), 5.

aircraft to increase survivability and added belly tanks to increase loiter time over friendlies.

> By the end of the Korean War, the Mosquitos had flown 40,354 missions. The 6147th received two Presidential Unit Citations and one Korean Presidential Unit Citation. Because of a job well done, there was talk about designing a new aircraft for the airborne controller. Instead the Mosquito FACs were disbanded three years after fighting ceased…After 1956, the USAF was without a forward airborne control organization. The Mosquito FAC was looked on as a battlefield expedient with no permanent place in Air Force Doctrine.[3]

The United States moved forward in the Cold War with a heavy reliance on nuclear munitions. Strategic Air Command had its eyes trained on long-range bombers and the development of Intercontinental Ballistic Missiles.[4] The time period just before the Vietnam War would be rife with interservice competition for resources, and the focus was on strategic deterrent capabilities.

During the Vietnam War, the Mutually Assured Destruction doctrine gave way to Flexible Response. President John F. Kennedy needed a new approach to deal with communist expansion in underdeveloped countries. This problem occurred during the height of the Cold War, and the President felt he had no conventional forces to deter and counter the Soviets, short of deploying nuclear munitions.

---

[3] Jan Churchill, Hit My Smoke: Forward Air Controllers in Southeast Asia (Manhattan: Sunflower University Press, 1997), 9.
[4] Neil Sheehan, *A Fiery Peace in a Cold War: Bernard Schriever and the Ultimate Weapon* (New York: Vintage Press, 2009), 166.

Nikita Khrushchev, the Russian premier at the time, announced Soviet support for "wars of national liberation."[5] State-on-state war was unacceptable given the nuclear threshold, but both U.S. and Soviet Union leaders were willing to engage in an indirect way using assets of low intensity. Set-piece war against the Russians was not going to happen, even though American forces were organized, trained, and equipped for such conflict. The services were unprepared to fight in a low-intensity environment. They anticipated the transition for their high-tech conventional forces would be manageable, at least more manageable than the converse.

The special operations community had the closest approximation of forces to conduct low-intensity counterinsurgency operations through Army Special Forces, or “Green Beret” groups. They focused primarily on unconventional warfare actions in Western and Eastern Europe and only switched to a focus on counterinsurgency in the early 1960s. The Air Force had aircraft to support the Army Special Forces, but it had few capabilities, much less units, dedicated to low-intensity conflict.

The Air Force formed the 4400th Combat Crew Training Squadron (CCTS) in response to President Kennedy’s concerns. This unit was responsible for advising the host-nation pilots and flying in combat shoulder-to-shoulder with them. The unit’s nickname was Jungle Jim. It

---

[5] Robert F. Futrell, *The United States Air Force in Southeast Asia: The Advisory Years to 1965* (Washington, D.C.: Office of Air Force History, 1981), 63.

was the first use of light-attack aviation in a counterinsurgency role for the purpose of building partnership capacity. The instructor pilots used the lessons learned from past unconventional conflicts to train selected USAF personnel. First, they taught their initial cadre of pilots to operate and maintain low-tech aircraft and equipment. Second, they prepared those light-attack aircraft for transfer to friendly foreign governments. Third, they provided advanced training to host-nation personnel. Finally, they improved the weapons, tactics, techniques and procedures of host-nation operators.[6]

The squadron used World War II-era aircraft in the field. These aircraft were robust enough to complete the mission at hand, but they did not throw up any red flags of American imposition or direct threats to the Soviet Union. Additionally, such platforms did not cost the Air Force a lot of money, as would have been the case had the 4400th CCTS used a modern, jet-based inventory.

[6] Charles H. Hildreth, *USAF Counterinsurgency Doctrines and Capabilities, 1961-1962* (Washington, DC: USAF Historical Division Liaison Office, 1974), 19

Fig.4 T-28 Fig. 5 B-26 Fig. 6 AC-47

Fig 1 http://upload.wikimedia.org/wikipedia/commons/1/1a/USAF_T-28_VNAF_colours_1962.jpg,

Fig 2 http://upload.wikimedia.org/wikipedia/commons/0/0a/B-26Cs_BienHoa_1962.jpg

Fig 3 http://static.ddmcdn.com/gif/douglas-c-47-2.jpg

The C-47 (Fig. 6) initially conducted medium airlift and transport for the unit, but a modified version (AC-47 "Spooky" gunship) provided ground-attack support to friendly units as well as aerial reconnaissance. T-28s (Fig.4) and B-26s (Fig.5) conducted ground-attack and aerial-reconnaissance missions. Later, Vietnamese pilots and observers were trained in the O-1F Bird Dog to fly as FACs.[7]

The aircraft were chosen for four reasons. First, they could be equipped and maintained in harsh conditions. Second, they were likely to be accessible to or even resident to the current inventories of weak and failing states. Third, they were not too high-tech for the host nation to operate, maintain, and supply. Finally, they were tough, had long

[7] Jan Churchill, *Hit My Smoke: Forward Air Controllers in Southeast Asia* (Manhattan: Sunflower University Press, 1997), 12.

loiter times, and could handle takeoffs and landings from short runways with rough surfaces under the control of sometimes marginal pilots.[8]

The 4400th CCTS picked up the air advisor role in South Vietnam as a part of Operation Farm Gate. While assigned there, the 4400th CCTS trained South Vietnamese Air Force pilots in the skills of ground attack using gun and dive bombing tactics, forward air control employment, and formation flight standards of maneuver. The rules of engagement were unique, as the United States carried out an advisory role. In order to go out on missions, Vietnamese airmen were always on board. Missions with American aircrew alone were technically forbidden. There were a total of 4,040 sorties flown in support of Operation Farm Gate and the majority of early T-28 missions were flown at night. The T-28 pilots were very successful at finding enemy targets of opportunity, and on average half of the sorties would result in a crew expending its entire ordnance hitting enemy fielded forces.[9]

T-28 sorties were normally flown in a two-ship formation for day strikes against preplanned targets or for armed escort for slow-speed fixed-wing or helicopter operations. Night operations were single-ship armed reconnaissance. Ordnance for the day missions included

---

[8] Col Kenneth J. Alnwick, "Perspectives on Air Power at the Low End of the Conflict Spectrum," *Air University Review* 35, no. 3 (March-April 1984): 26

[9] Nathaniel Overson, *Before the 6 SOS there was the 4400 CCTS*, 14 April 2009, http://www2.hurlburt.af.mil/news/story.asp?id=123144326 (accessed 19 May 2013).

conventional low-yield bombs and napalm. Night sorties added flare dispensers and a 55-gallon auxillary fuel tank to extend loiter time for Search and Rescue missions.[10]

The mission began to change for the 4400th CCTS as the war in Vietnam progressed. While initially an advisory-only role, the Air Commando's mission slowly shifted to training US aircrews for upcoming duty in Southeast Asia. The number of ground units grew steadily, and they needed aerial support. The air advisors would fly more direct combat missions in support of ground troops, and their training for host-nation forces dwindled as resources became scarce.

The advisors never gained full commitment from the services, and the decision to move from a training role to direct combat operations seemed inevitable. The services saw HN forces as incapable of holding off the Viet Cong after the assassination of Ngo Dinh Diem. In 1965, combat troops replaced advisors, because infiltration from the north into South Vietnam was growing, and the government of South Vietnam was unable to deal with the escalating situation. US policymakers saw the union of these factors as defeat for the South, and the advisory function was abandoned in favor of direct US air and ground participation in the conflict. However, the advisor units in place would form the core of the

[10] Pacific Air Forces, *T-28 Operations M-42163-u no.68* (Maxwell: Air University, 1967)

USAF buildup in 1965, and they passed their resident knowledge on to inbound combat troops.[11]

The US experience with Farm Gate between 1961 and1963 exposed several issues concerning air-advisory efforts in light-attack aircraft with the Vietnamese. First, the program demonstrated the need for advisors who understood cultural awareness and could speak the native language. Second, low-tech aircraft were easier to use when training the South Vietnamese. Third, a consistent long-term engagement was important to build trust and make measureable progress. Finally, airpower played a critical supporting role for COIN operations in firepower, aerial resupply, and intelligence-gathering.[12]

Farm Gate personnel exhibited a lack of cultural awareness and language skills which highlighted a major flaw for effective training and advising. Americans and the Vietnamese had a poor working relationship, because Americans would not learn to speak in Vietnamese to their host nation counterparts. This created a wedge between instructor and trainee. Americans would wait until the VNAF spoke English before they would engage the students. They would even send VNAF pilots to stateside training programs and wait for their return to

---

[11] Robert F. Futrell, *The United States Air Force in Southeast Asia: The Advisory Years to 1965* (Washington, D.C.: Office of Air Force History, 1981), 268.

[12] Edward B. Westermann, "Relegated to the Back Seat: Farm Gate and the Failure of the US Advisory Effort in South Vietnam, 1961-1963*"* in *Military Advising and Assistance,* ed, Donald Stoker et al. (New York: Routledge Press, 2008)

Vietnam. It was a very inefficient system which was repeated recently for Afghan pilots: "Likewise, a tendency to speak derogatorily of their Vietnamese counterparts and treat them like so many undereducated and underprivileged children further inhibited the growth of close personal relationships."[13] Westermann goes on to make the following assessment of Farm Gate:

> "The USAF air advisory mission also underlines the importance of selecting and employing the appropriate technology when fighting in an insurgency environment. In this case, the use of World War If era propeller-driven aircraft proved especially effective due to their ability to operate from austere bases, their relative ease of maintenance, and their ability to fly low and slow. The belief by some USAF officers that jet aircraft, with their improved speed and range, constituted the most effective weapons systems catalyzed a propeller versus jet debate. For his part, General Aderholt warned, 'My God, we are in trouble if we think that jet technology and high performance fighters have made less advanced capabilities obsolete.' Likewise, General Pritchard noted his concern about the USAF obsession with advanced technologies at the expense of more appropriate aircraft."[14]

The lack of continuity plagued the advisory efforts. As soon as progress and trust developed, a new group of advisors would come in, and the old would leave. Every new group would come in and go through the same stages of disbelief as their predecessors. As soon as they started to make progress, a new group would replace them as well.

---

[13] Edward B. Westermann, "Relegated to the Back Seat: Farm Gate and the Failure of the US Advisory Effort in South Vietnam, 1961-1963" in Military Advising and Assistance, ed, Donald Stoker et al. (New York: Routledge Press, 2008), 144.

[14] Edward B. Westermann, "Relegated to the Back Seat: Farm Gate and the Failure of the US Advisory Effort in South Vietnam, 1961-1963" in *Military Advising and Assistance*, ed, Donald Stoker et al. (New York: Routledge Press, 2008), 145.

American personnel deployed for temporary duty assignments ranging from 30 to 179 days. One general remarked, “Continuity is necessary in working with the South Vietnamese --they work on a friendship or personal basis, in many cases, rather than just the fact that we were there to assist and work with them.”[15]

The focus on direct combat missions continued until the end of the war. The 4410th CCTS would become the most decorated squadron in the Vietnam War with 6 Silver Stars, 1 Legion of Merit, 33 Distinguished Flying Crosses, 1 Airman’s Medal, 21 Bronze Stars, 547 Air Medals, and 6 Purple Hearts.[16] “By 1974, with the US withdrawal from Southeast Asia completed, the Air Force deactivated the Special Air Warfare Center (since renamed the US Air Force Special Operations Force).”[17] AFSOC reestablished the Air Force Special Operations Warfare Center (AFSOWC) in 2012. Upon termination of the Vietnam War, the focus of the Air Force began to change. The Cold War and a desire to remove the possibility of another Vietnam were primary considerations for political and military leaders of the day.

---

[15] Edward B. Westermann, “Relegated to the Back Seat: Farm Gate and the Failure of the US Advisory Effort in South Vietnam, 1961-1963” in *Military Advising and Assistance*, ed, Donald Stoker et al. (New York: Routledge Press, 2008), 144.
[16] The Airborne Forward Air Controller Training Manual for the 4410th CCTS, Holly Field 1967.
[17] Lt Col David J. Dean. “The USAF in Low-intensity Conflict: The Special Air Warfare Center." *Air University Review* 36, no. 2 (January-February 1985):

The Air Force turned its back on hard-won lessons learned concerning the limited war it had fought in Southeast Asia. Instead, Air Force planners concentrated on AirLand Battle, developing high-technology weapon systems such as the A-10 in response to the Army's accusations that the Air Force had not taken the Close Air Support role seriously in Vietnam.[18] The UH-1 and AH-1 were not sufficient to attack hardened targets as they carried only light rockets and small-caliber guns. Additionally the Air Force's F-100, F-105, and F-4 aircraft were too fast to accurately acquire ground targets in close proximity to friendlies, and the A-1 Skyraider, the Air Force's remaining CAS platform, was aging badly.

The Air Force organizationally stayed focused on weapon systems necessary for those scenarios associated with nuclear deterrence and high-intensity conventional war in Europe and the Asia-Pacific region. Similar to the other services, the Air Force focused on conventional war with little to no consideration for low-intensity conflict. The bad taste for insurgencies was personified by Air Force leaders who said "we should not be distracted by 'those kind of wars' since we can always just 'muddle through'."[19] This kind of thinking was prevalent prior to the

---

[18] James G. Burton, *The Pentagon Wars: Reformers Challenge the Old Guard*, (Annapolis: Naval Institute Press, 1993)
[19] Dennis M. Drew, *Insurgency and Counterinsurgency: American Military Dilemmas and Doctrinal Proposals* (Maxwell AFB, Ala.: Air University Press, 1988), 3.

terrorist attacks of September 11th. It also appears to be gaining momentum with the personnel drawdown from Iraq and Afghanistan.

There are a few takeaways pertinent to this brief sampling of light-attack history. The first is the concept of access. In 1961, the US began a small assistance program to train the South Vietnamese. The cost and commitment were modest compared to other courses of action. However, the relationships and experience gained from this access created the building blocks for the massive military effort by the US and other partner nations as the war progressed. Additionally, the role of geography and terrain was important with regard to the effectiveness of high-technology aircraft like the F-100, F-105, and the F-4. The terrain was highly restrictive to aerial observation and required a lower-flying, slower aircraft to see into the dense canopy, which is common to Southeast Asia and other tropical areas on the Pacific rim.

At the time, the light-attack pilots and specifically forward air controllers were the liaison between the air and the ground units. FACs actually advised ground commanders and were tightly interwoven within the ground scheme of maneuver. Without a FAC's advice, the ground commander could not know when a particular platform would be available for his soldiers and what capabilities it could bring to the table.[20] This kind of intimate relationship was unlikely to develop between high-flying, fast jets of the day. The intimacy and trust

[20] Jan Churchill, *Hit My Smoke: Forward Air Controllers in Southeast Asia* (Manhattan: Sunflower University Press, 1997)

developed between light-attack pilots and ground elements enables a level of detailed integration and precision with troops in close contact to the enemy which cannot be rivaled. These qualitative considerations in the acquisition of aircraft systems are force enablers which cannot be accounted for by traditional spread sheets and metrics. The lower end of the spectrum of conflict requires experience and a tailored approach for airpower to reach its full potential.

Another important takeaway from the light-attack legacy is air superiority. Light-attack aircraft were best utilized once air superiority was achieved. These conditions allowed the freedom of movement these smaller aircraft required to closely integrate with the ground fighters and effectively focus their attention in the weeds. Light-attack aircraft were not designed to take on other aircraft or integrated air defense systems (IADS). If air superiority could not be assured, the value of these aircraft to the ground forces was significantly reduced. However, once air superiority was assured, they offered a peculiar interoperable capability to the ground commander, often superior to that afforded by the more expensive and advanced aircraft of their time.

## Chapter 4

## Operations and Mission Sets

*For those missions that still require manned missions, we need to think hard about whether we have the right platforms—whether, for example, low-cost, low-tech alternatives exist to do basic reconnaissance and close air support in an environment where we have total control of the skies—aircraft that our partners also can afford.*

*— Secretary of Defense Robert Gates, Maxwell AFB, 21 April 2008*

The purpose of this section is to discuss where the light-attack concept fits within the world's political and military landscape to determine whether there is a modern need for this kind of aircraft. Specifically, it will look at air power operations and mission sets which are needed today and for the foreseeable future in environments where air superiority is assured. Then it will detail whether those operations and mission sets are peculiar or optimally supported in a niche capacity by light-attack aircraft. Air superiority is assumed for the remainder of the analysis, and a lack of air superiority assumes a great loss in mission effectiveness for light-attack aircraft.

The air operations and mission sets which will be examined are Intelligence Surveillance and Reconnaissance (ISR), Close Air Support (CAS), Personnel Recovery (PR), Homeland Security (HS), Armed Escort (AE), Stability Operations, Counterterrorism (CT), and Undergraduate Pilot Training (UPT).

## ISR

In order to be successful on the battlefield, a military commander must have a good understanding of the operational environment. He gains this understanding through the intelligence function. He must be able to collect, integrate, and evaluate information on enemy capabilities as well as the environment where operations may occur in the immediate future. This is critical to minimize the effects of fog and friction. It also gives the commander the best opportunity to get inside of the enemy's decision cycle.[1]

Intelligence aids the commander in determining which forces to deploy. It also helps to determine when forces should be deployed, with which techniques, and provides specifics about battlefield location. In the US, many organizations such as the National Geospatial Intelligence Agency, Central Intelligence Agency, Defense Intelligence Agency, and the National Security Agency, share intelligence; so effective collection must include and consider these stakeholders.

In order to optimally support the intelligence function in the joint environment, an aerial platform chosen for ISR missions should encompass some generic intelligence process components. First, it should enable the planning and direction of leadership, to include counterintelligence activities that protect against espionage, sabotage, and assassinations. Second, the aircraft should allow for the collection of

[1] Frans Osinga, *Science, Strategy, and War: The Strategic Theory of John Boyd* (New York: Routledge, 2007), 2.

data which can be quickly processed, analyzed, and exploited to produce timely and relevant information. Third, the aircraft must be able to push the information to leadership, planners, and operators on the ground in a timely fashion before the data becomes obsolete. Finally, the aircraft should be able to take real-time inputs from active stakeholders in order to adjust the data in an optimal way for end users.

Light-attack aircraft provide some benefit to ISR in comparison to more technologically advanced aircraft. First, light-attack aircraft can operate from small, unprepared surfaces in the field. Some variants can perform short takeoffs and landings from aircraft carriers and large-deck amphibious-assault ships without using catapults or arresting wires. This means ISR pilots can be engaged face-to-face with ground units during mission planning, execution, and debriefing. Second, light-attack aircraft can have long loiter times, from 4-10 hours, without the need for air-refueling capabilities. This allows light-attack ISR pilots the ability to direct forces from the air or pass real-time information over data links without leaving the operating area for fuel. Lastly, light-attack aircraft can fly low and slow over densely forested areas and difficult terrain. This allows pilots the ability to pick out visual targets which cannot be acquired by high-flying, fast-moving jet aircraft.

The unique flying efficiency and ordnance traits of light-attack aircraft also make them peculiarly qualified for the ISR mission of Armed Reconnaissance. This mission is normally flown by helicopters, but the

slow speeds and long loiter time of light-attack aircraft make them especially well-suited to fly around in designated areas searching for targets of opportunity that demonstrate hostile acts or hostile intent. Once a target is found, the light-attack aircraft can either employ its organic ordnance or coordinate a strike from a heavy aircraft or call for fire from an artillery battery.

**Close Air Support**

Close Air Support (CAS) is air action by "fixed-wing (FW) and rotary-wing (RW) aircraft against hostile targets that are in close proximity to friendly forces, and requires detailed integration of each air mission with the fire and movement of those forces."[2] The key to this mission lies in its detailed integration and the close proximity of friendlies to hostile forces. Due to the potential for fratricide, CAS has to be conducted precisely, and the munitions chosen matter as distance closes.

When the enemy is farther away from friendlies, jet aircraft such as the F-16 have the advantage of carrying larger ordnance than the 500-pound bomb which is typical to most light-attack aircraft. On the other hand, light attack aircraft can have munitions as small as the 0.50 cal machine gun which has significantly smaller "risk-estimate" distances. Fast movers will have quicker scramble times over long distances and decrease the wait time for troops in contact. Light-attack aircraft can

[2] JP 3-09.3, *Joint Publication Close Air Support*, 5 January 2007, I-1.

forward deploy, using their ability to take off from short, unprepared surfaces. Although the accuracy of high-speed aircraft is obviated by precision guided munitions (PGM), they are expensive. Light-attack aircraft can be as accurate with dumb munitions due to a smaller circular error of probability (CEP) at lower drop altitudes and speeds.

**Personnel Recovery (PR)**

Search-and-Rescue PR is a broad mission across all the services. It is focused on preserving US and allied lives through military, diplomatic, and civil efforts. By rescuing isolated and downed personnel, the US empowers its people who know every effort will be made by their government to return them to safety. This mission also decreases the propaganda effectiveness of captured citizens or allies by belligerent state and non-state actors. In addition to US citizens, the President of the United States or the Secretary of Defense, "shall provide PR support to other governments, agencies, organizations, and individuals in accordance with all applicable laws, regulations, and memoranda of agreement or understanding."[3] These agreements afford US allies with similar protections for their people and strengthen corporate resolve in other matters of security cooperation.

In PR, light-attack aircraft are ideally suited to function as the Rescue Mission Commander (RMC). The RMC controls recovery efforts in the objective area. The RMC's initial actions are to collect essential

[3] JP 3-50, *Joint Publication Personnel Recovery*, 5 January 2007, I-1.

information in the objective area on threats to the isolated personnel or recovery force. The RMC and lead-recovery-vehicle commander plan the extraction for isolated personnel.

Light-attack aircraft would serve as ideal RMC for three reasons. They have long loiter times and can stay over the target, building situational awareness and taking over for the On Scene Commander. The dual-crew capability allows for shared responsibility of friendly visual acquisition will flying and directing the recovery mission. Lastly, light-attack aircraft have the organic ability to mark a target and act as a FAC (A) if the situation deteriorates. The call sign ”SANDY” represents an individual (typically an A-10, F-16C/D or F/A-18 pilot) specifically trained to conduct RMC duties in support of PR missions.[4] Hearing this call sign over a radio has a special meaning to any downed aircrew or isolated personnel.

**Homeland Security**

Giulio Douhet claimed that airpower was inherently offensive, hence defense could be neglected territory, particularly when resources were constrained. This seems to be more prevalent in US thinking, and that may be due to the geographic considerations, with the US separated by two oceans from a large part of the world. However, the role of air power in Homeland Security is easily justifiable for international partners who face existential threats in close geographic proximity. One needs to

[4] JP 3-50, *Joint Publication Personnel Recovery*, 5 January 2007, VI 17.

look no further than the Battle of Britain for the importance of defensive air power for national security.[5]

Homeland Security includes missions which secure the ports, waterways, and coastlines. In the US, the Coast Guard carries a large burden with a focus in drug interdiction, migrant interdiction, defense readiness, and other types of law enforcement near the nation's maritime borders. The ability to monitor large areas and respond to threats in a timely fashion is important to these missions.

The Coast Guard relies heavily on helicopter support for its air power needs. Light-attack aircraft are not particularly well-suited to operate from ships, so a short takeoff and landing (STOL) capability would be necessary to operate over the sea domain. However, light-attack aircraft could provide a faster response time than rotary aircraft when long distances are involved. Additionally, some light-attack aircraft can loiter for longer periods of time, which may be attractive to ground units along the coast and watercraft operating in the littorals.

**Armed Escort**

Armed escort is a mission set which can be utilized in either conventional or special operations. The armed aircraft effectively provides overwatch and protection for some kind of high-priority package. A notional example in ground-operations support is a nuclear convoy. During convoy operations the escorting aircraft flies overhead and in

[5] Stephen Bungay, *The Most Dangerous Enemy: A History of the Battle of Britain* (London: Aurum Press, 2000), 186.

front of the convoy searching for threats and clearing potential ambush chokepoints. The convoy commander benefits from an eagle-eye perspective of the entire convoy, and he can command the convoy through radio relays in the overhead aircraft when mountainous geography separates individuals within the convoy.

An escort package could comprise a helicopter carrying troops (aerial package) or a boat completing riverine and littoral operations (water package). The vast range of speed allows the light-attack aircraft to remain close to the package when needed and push ahead to search for threats before they become a risk to the package. If the package is attacked, it can initiate evasive maneuvers while the escort aircraft engages with an array of ordnance tailored to the threat and conditions. As a large majority of the world's goods are moved by water, the protection of shipping, including coastal sea control, harbor defense, port security, countermine operations, and environmental defense, is paramount. This is especially true in some congested areas where small-boat tactics can be used by terrorists and pilots to control shipping operations. Simple show-of-force operations can demonstrate US resolve. The appearance of a credible military force can defuse a situation that, if allowed to continue, may be detrimental to US interests. A light-attack aircraft orbiting overhead is an inexpensive way to deter aggressive enemy behavior against high-value assets. These operations can double

to show US commitment to its multinational partners in regions affected by piracy and terrorism.

## Stability Operations

Stability operations are not very popular with traditional military leadership, and some of the strategic difficulty lies in defining the problem to be solved. If there is any question about this assertion, one needs to look at the recent budget to see where the money is allocated. Stability operations are slow and painstaking. They do not offer very good metrics to be used on annual officer performance reports. Body counts and tonnage moved are easy to define and show progress, but preventing failed states is hard to quantify. Nevertheless, the current state of the DOD budget is driving decision makers to realize the US cannot carry the world's security on its back anymore. Stability operations are a way to contribute without breaking the bank through the large logistical tax of conventional military operations. Some subsets of stability operations to be discussed in more depth are peace operations (PO), counterinsurgency (COIN), foreign humanitarian assistance (FHA), and foreign internal defense (FID).

Peace operations is a category that encompasses operations to contain conflict. The overarching goal is to shape the atmosphere to support cooperation and rebuilding without resulting to conflict. Two sides that disagree have to be persuaded to consent to and comply with a new status quo. If a state can be preserved peacefully, it will not have to

be rebuilt later at a higher cost. In peace operations, the US military will usually fall under the sponsorship of the United Nations (UN) or another International Governmental Organization (IGO).[6] In these kinds of operations, light-attack aircraft would most likely serve in a monitoring, reporting, and deterrent capacity. Intervening with force is a last resort, as the motivation to escalate fighting is self-defeating to the overall goals of PO.

COIN is the combined efforts by military and civilian agencies to squelch an insurgency. In order for COIN to be successful, the original grievance underpinning the conflict has to be addressed. If the relevant population feels the insurgent is better suited to meet their needs than the government, COIN is unlikely to succeed. Close coordination between the civilian agencies working the grievance on the ground and military action is critical. COIN can require fighting and rebuilding at the same time.

Light-attack aircraft are ideally suited to a COIN fight for two reasons.[7] First, the aircraft can be deployed in larger numbers to cover a broad area where civilian agencies work on the ground. Second, if an insurgent must be destroyed, light-attack aircraft can provide a tailored ordnance to minimize collateral damage, which is counterproductive to the COIN effort. If you kill one insurgent and three innocent children

---

[6] JP 3-07.3, *Joint Publication Peace Operations*, 17 October 2007.
[7] JP 3-24, *Joint Publication Counterinsurgency Operations*, 05 October 2009.

with a 2000-pound bomb, the efforts on the ground to win popular support will not take hold with the resident population. Additionally, the strategic communication of such acts, exploited by insurgents, will likely hurt US foreign relations on the international stage.

During foreign humanitarian assistance (FHA) the military uses its assets and manpower to support the United States Agency for International Development (USAID) or the State Department. FHA is conducted outside the US to "relieve or reduce human suffering, disease, hunger, or privation." FHA is conducted in response to natural disasters like hurricanes and earthquakes. It can also take place in response to massive terrorist attacks or human-rights atrocities. The goal is to supplement the host-nation civil authorities, who may be unable to provide for their own citizens at that time. In this case, light-attack aircraft can be used to fly DOS and host-nation officials around to assess the damage and plan a response.[8] Light-attack aircraft can be used in mass to show US resolve over multiple areas which have been devastated. Lastly, a light-attack aircraft can be used in a Sandy capacity to mark airlift drop locations and for sequencing personnel recovery by helicopters in SAR scenarios.

Civilian and military agencies of a government cooperate in foreign internal defense (FID) with host-nation governments, "to free and protect its society from subversion, lawlessness, insurgency, terrorism, and

[8] JP 3-29, *Joint Publication Foreign Humanitarian Assistance*, 17 March 2009.

other threats to their security."[9] The Air Force conducts aviation foreign internal defense (AVFID) through the 6th Special Operations Squadron. This squadron is the most qualified unit in the Air Force to conduct FID, but is significantly limited in its capacity to respond to HN requests for support and currently does not offer a light-attack option.

Light attack and FID are accomplished during peacetime to build relationships. Building relationships takes a great deal of time, and laws of harvest apply. To reap the harvest of the fall, we must plant the metaphorical HN garden in the spring and continue weeding, irrigating, and fertilizing through the summer. In time, these investments in partnerships may bear fruit during a crisis, providing access and partners to deal with multilateral problems. Unified action is possible only through this approach.

Stability operations are preventative in nature in peacetime. This can make it difficult to find the resources to conduct such operations in constrained environments. However, investments made over long periods of time with a country build trust, which leads to access and a smoother transition to action during crisis response. The following example demonstrates a realistic scenario where the US had to leverage real-time ad hoc stability operations in response to a natural disaster.

[9] JP 3-22, *Joint Publication Foreign Internal Defense*, 12 July 2010.

EXAMPLE OF STABILITY OPERATIONS IN A CRISIS RESPONSE/ LIMITED CONTINGENCY OPERATION

On 28 December 2004, the US committed forces to Southeast Asia to respond to the 26 December 9.15-magnitude earthquake that struck off the west coast of Indonesia and the ensuing series of devastating tsunamis throughout the region. Only 10 days after the earthquake and tsunamis struck, Operation UNIFIED ASSISTANCE included over 25 ships, 45 fixed-wing aircraft, and 58 helicopters, working with US Government, host nation, and international partners. Although stability operations were the primary component of this foreign humanitarian assistance (FHA) mission, defensive activities were constant; in particular, ongoing insurgencies in Indonesia and Sri Lanka as well as large numbers of refugees and concerns about US intentions by the largely Muslim population made force protection a top priority. In UNIFIED ASSISTANCE, which lasted only about six weeks, the primary goal was to provide immediate response humanitarian assistance in the form of life-sustaining water, food, and medicines. The joint force generally avoided transformational stability activities, although the hospital ship USNS Mercy assisted in rebuilding Indonesia's emergency medical services. At the operational level, Operation UNIFIED ASSISTANCE succeeded in assisting with transportation and communications so as to enable the flow of aid. At the strategic level, this FHA operation assisted in improving diplomatic relations, increasing military-to-military cooperation, and fostering public good will.

SOURCE: *Waves of Hope: The US Navy's Response to the Tsunami in Northern Indonesia*
Bruce A. Elleman
Naval War College Newport Papers No. 28

## Counterterrorism (CT)

The low-cost, highly flexible characteristics of asymmetric warfare makes it a highly probable option for US adversaries. In this kind of conflict, the military can move from supported to supporting agent rapidly. Light-attack aircraft have the potential to operate with a small footprint in areas where the US cannot use conventional forces with a large logistical requirement. Building long-lasting relationships with other USG civilian agencies and foreign security partners, taking unified

action to protect populations, maintaining legitimacy and influence over those populations, and physically isolating terrorist organizations from populations comprise the buck of CT operations.[10]

> "US superiority in conventional warfighting drives many of our adversaries to avoid direct military confrontation with the United States. Irregular Warfare (IW), and especially the employment of terrorist tactics, has become the warfare of choice for some state and non-state adversaries**.** They employ a strategy of physical, economic, and psychological subversion and attrition to undermine, erode, and ultimately exhaust the national power, influence, and will of the United States and its strategic partners. They fight us from amongst the people in protracted struggles for popular support and legitimacy, and limit the utility of our conventional military power."[11]

## Undergraduate Pilot Training

UPT is a chief concern for any flying venture, because it is the cornerstone for all future development. Thorndike's Law of Primacy holds true. In order to create the type of pilots desired, they must be trained from the beginning in uniform fashion to established standards. Things learned first create a strong impression in the mind that is difficult to erase.[12] Ideally, people are trained the correct way the first time, so later they do not have to unlearn bad behaviors and habit patterns.

UPT is concerned with teaching the basics of flight and a culture of discipline and competence. This is the place where an operator learns flight and checklist procedures. It is important for the pilot to complete

---

[10] JP3-26, *Joint Publication Counterterrorism*, 13 November 2009, III-3.
[11] JP3-26, *Joint Publication Counterterrorism*, 13 November 2009, III-1.
[12] Edward Thorndike, *The Fundamentals of Learning* (New York: Teachers College Press, 1932)

maneuvers in a controlled and repeatable fashion to increase mission effectiveness and safety. Maneuvers are briefed, then demonstrated by an instructor. The student pilot then attempts the maneuver, and the instructor gives feedback. Students learn decision-making, risk management, communication, mission planning, briefing, and debriefing skills. Common UPT syllabi include takeoffs and landings in the traffic pattern, emergency procedures, instrument flight in the weather, and formation flight. Depending on student proficiency, these maneuvers can require much exercise and many repetitions to achieve the desired level of performance.

With regard to equipment, the first requirement for UPT is safety. The aircraft must be safe enough to allow the student to make mistakes, while allowing the instructor time to take control of the aircraft before it is unrecoverable. As the maneuvers must be repeated several times, an optimal trainer is inexpensive to maintain and operate. Lastly, the trainer aircraft should create an environment which will be similar to future operations to the maximum extent possible. The more closely matched the trainer with the mission, the smoother the transition to operational aircraft, and the lower the cost.

Using the unarmed airframe of a light-attack aircraft as a trainer aircraft is quite common around the globe. Additionally, converting a trainer aircraft to a light-attack aircraft has happened as was the case with the T-6-to-AT-6 transition for Hawker Beechcraft. The light-attack

aircraft is optimal in this instance, because it can pull double duty as a trainer and operational aircraft. By purchasing large numbers of light-attack aircraft, it is possible to achieve economies of scale. Aircraft parts are notionally cheaper and more readily available. It is feasible to decrease training time as pilots do not have to learn new weapon systems for a defined group of missions. The knowledge pool in the maintenance and operations departments is increased. Additionally, it is possible to rotate instructor deployments between operational and training tours while optimizing the flying schedule through an increased pool of pilots and aircraft maintainers.

## Chapter 5

## Global Opportunities

*The Asia Pacific region reflects a fundamental truth — the United States has been, and always will be, a Pacific nation*

– President of the United States, Barack Obama

*I have long believed that the United States-China relationship requires a long-term perspective, it is measured less by major breakthroughs, than by slow steady progress over time, to build a relationship and to work on activities in areas of mutual interest*

–Secretary of Defense Leon Panetta September 22 2012

With the recent pivot to the Asia Pacific, international eyes turn toward the PACOM commander to discern his military priorities. Will the US posture for a containment or combative approach against China? Is the military culturally ready for a slow engagement strategy which considers the interagency vested interests with a long view? More specifically, will PACAF and the USAF invest itself completely in this kind of military power on par with the other services?

The purpose of this section is to delve into the Asia-Pacific region to analyze security concerns in the region and see where employing light attack aircraft will make a worthwhile difference. First, a sampling of security concerns and defense postures from five countries in the region will be outlined. Second, these concerns will be compared to the US

interests in the region. Lastly, light-attack mission sets which align with the interests of all countries engaged will be highlighted to show opportunities for employment in the Asia-Pacific region. The nations which will be studied are as follows: Indonesia, Malaysia, Philippines, Singapore, and Thailand.

## Indonesia

Indonesian response to China has been overtly cordial in recent years even though suspicions of Chinese hegemonic tendencies and meddling in its internal affairs do exist. However, Indonesia has a larger problem and preoccupation with domestic instability and the foreign-policy direction of its government. The suspicion of China is a result of Beijing's involvement in the country's politics prior to the the coup of 1965. Additionally, Indonesians fear that China will try to influence domestic Indonesian politics. China's intentions in the South China Sea also concern locals. Fortunately, Indonesians do not have claims to the Spratly Islands like some of the other ASEAN countries, so this is one less area for friction.

Indonesian defense policy remains predominantly focused on internal stability. Police and military forces are stretched thin and are unable to control the 17,000 outlying islands, and the surge of ethnic and religious movements on some for autonomy. The conventional defense capability continues to be a modest effort at best. Personnel requirements eat up a great majority of the defense budget.

Advancements in technology are rare, because there is little money left to invest in research and testing. Economic turmoil has kept the military from making advancements through purchases in combat aircraft and helicopters from countries like Germany.[1]

The Republic of Indonesia has tried very hard to keep extra regional powers out of Southeast Asian affairs, and it leaders desire local autonomy. The leaders of the country uniformly believe that native countries should manage Southeast Asia and be responsible for its security and order. Regional cooperation is preferred over reliance on external powers. As a part of ASEAN, Indonesian leaders have had to soften their hardline stance against extra-regional help as other countries within ASEAN have a strong preference to maintain access to powers with desirable capabilities that reside outside the region.

The Indonesians practice a foreign policy called *bebas aktif* which means "independent but active." Indonesians, like many other countries within the Non-Aligned Movement, tried to stay neutral between the US and Soviet Union during the Cold War. They did not wish to rely on a particular side. Signing an international agreement would have locked them into an undesirable position. The disgust for outside involvement stems from the struggle for independence during the national revolution

[1] Richard Sokolsky, Angela Rabasa, and C.R. Neu, *The Role of Southeast Asia in U.S. Strategy Toward China* (Santa Monica, CA: RAND, 2000), 53.

of 1945-1948.[2] They reject any possibility of accepting a formal collective defense posture. While not interested in collective defense from extra-regional sources, Indonesia is engrossed in cooperative regional security through ASEAN countries, as long as it does not target regional partners.[3]

There are two narratives here. The first is severe restrictions on what we can provide to Indonesia militarily because of human rights violations in the 1990s in East Timor, Aceh, and Irian Jaya. Second, the GWOT has provided us opportunity, due to shared threats (JI), to conduct low-level engagement. Such engagements (think the DoS-led work with Det 88, as well as the 6th SOS) are politically palatable to both the Indonesians and us due to their small footprint and the Indonesian need to address the internal JI threat that is connected to the global AQ network. The bottom line is that while the tendencies you outline above are true, they do not describe what opportunities are available for US/Indonesian partnering or collaboration. If the threat is China, within Indonesia there is still a great deal of residual fear and suspicion over Chinese subversion among Indonesian leaders given the breadth and depth of Chinese investment and business ownership in the country; there are reasons why the Chinese are targeted during riots and other

---

[2] See Seng Tan and Amitav Acharya, *Asia-Pacific Security Cooperation: National Interests and Regional Order* (Armonk: East Gate Press, 2004), 72.

[3] See Seng Tan and Amitav Acharya, *Asia-Pacific Security Cooperation: National Interests and Regional Order* (Armonk: East Gate Press, 2004), 81.

periods of instability in the country, not to mention them being labeled as "locusts."

**Malaysia**

The Malaysian elite and its army continue to be suspicious about China's long-term intent in the South China Sea. This suspicion is based in the historical legacy of China's support for the predominantly ethnic Chinese Malaysian guerillas during the communist insurgency of the 1950s and 1960s. Malaysia has restructured its military forces to focus protection on maritime and territorial claims in the South China Sea. The end of communist insurgency fashioned the modern response to the strategic environment. The US military presence in the region has diminished over time. The Malaysian government feared aggressive actions by the Vietnamese and Chinese. The Vietnamese were seen to have expansionist tendencies. The Chinese were too assertive in the region, and Malaysians have claims in the Spratly Islands.

China and Malaysia have avoided conflicts over areas in the South China Sea, but there is a chance of Chinese subjugation of Malaysian areas in the Spratly Islands. Ethnic strife is common in Malaysia, and this causes internal instability. The 1969 race riots of Kuala Lumpur show how bad the situation can get between the Malay elite and the ethnically Chinese Malaysian minorities. Ethnic tensions have been low in the past few decades due to a strong economy. Any future economic tension could lead to ethnic fighting. Malaysian Chinese partnerships

paid dividends for Beijing by helping to block the emergence of an ASEAN consensus in opposition to China's claims in the South China Sea.[4]

Malaysia does not have clear defense or security contracts with other countries. They are included in the Five Power Defense Arrangement (FPDA), but it is merely an arrangement between Singapore, Malaysia, New Zealand, Australia, and the United Kingdom.[5] Political stability, economic success, and social harmony are pivotal to national security. Therefore, internal security took precedence over strictly militaristic defense improvements. However, internal terrorists had aimed at incumbent regimes in Malaysia. These regimes were considered to be illegitimate because they were secular. The Jemaah Islamiyah (JI) and the Kumpulan Mujahidin Malaysia (KMM) are Islamist groups considered direct threats to the regime. Taking advantage of the US-declared GWOT, secular Malaysian regime leaders have used this opportunity to crack down on internal Muslim dissent after September 11th. Malaysia cannot afford overt cooperation with the US due to anti-western sentiment. However, a light footprint partnership has been used

---

[4] Richard Sokolsky, Angela Rabasa, and C.R. Neu, *The Role of Southeast Asia in U.S. Strategy Toward China* (Santa Monica, CA: RAND, 2000), 38.
[5] Chin Kin Wah, *The Defense of Malaysia and Singapore: The Transformation of a Security System, 1957-1971* (Cambridge: Cambridge University Press, 1983), 182.

in the past and could be an avenue for US-Malaysia bilateral security partnerships in the future.[6]

**Philippines**

The Chinese are considered to be the Philippine's main long-term threat in the South China Sea. The dispute between China and the Philippines centers on the Kalayaans, islands associated in the Spratly archipelago. These areas are critical for gas, oil, and wildlife fisheries. The US navy closed Subic Bay after a new base agreement could not be defined. This move left the Philippines with a weak military presence. The Chinese moved in to exploit the area well within the Philippines Exclusive Economic Zone (EEZ). After China became a consistent nuisance, the Philippines recognized the need to renew a base agreement with the US. The new agreement revitalized bilateral security partnerships.

The Philippines signed a Visiting Forces Agreement (VFA). It helped to reestablish US presence, and therefore enhance its deterrent value against China in the region. The Philippines have made small advances in their military. Despite China's encroachment in the Spratly Islands, minimal actual military development occurred. The Philippines rely on the US for naval presence. They do not currently have an up-to-date military capable of autonomous defense of national waters, much less

[6] See Seng Tan and Amitav Acharya, *Asia-Pacific Security Cooperation: National Interests and Regional Order* (Armonk: East Gate Press, 2004), 149.

sovereignty patrols. The country is also plagued by frequent low-level revolts which cost money that could be used for military transformation.[7]

The Philippines are involved in the ASEAN Regional Forum (ARF), but this organization is still in its infancy. The Philippine decision to invigorate its bilateral security alliance with the United States stemmed from this realization. The ARF is an extension of the yearly ministerial-level meeting of members of ASEAN and affords a venue for discussion and diplomacy and the development of cooperative responses to regional problems.[8] American assistance can help externally with China. Additionally, bilateralism can assist the Philippines in neutralizing two radical domestic insurgent groups—the communist New People's Army and the secessionist Moro National Liberation Front.[9]

**Singapore**

Singapore is a predominately ethnic Chinese island-state dependent on international trade for its economic survival. It is very concerned with maintenance of the regional balance of power. Singapore

---

[7] Richard Sokolsky, Angela Rabasa, and C.R. Neu, *The Role of Southeast Asia in U.S. Strategy Toward China* (Santa Monica, CA: RAND, 2000), 33.
[8] Encyclopædia Britannica Online Academic Edition, "ASEAN Regional Forum (ARF)," http://www.britannica.com/EBchecked/topic/752823/ASEAN-Regional-Forum-ARF/ (accessed 19 May 2013)
[9] See Seng Tan and Amitav Acharya, *Asia-Pacific Security Cooperation: National Interests and Regional Order* (Armonk: East Gate Press, 2004), 154.

is also concerned with managing its critical relationship with contiguous Malaysia, the stability of Indonesia, the future of US presence, and China's long-term intentions in the South China Sea.

Singaporeans worry about a hegemonic China and power balancing with similar interests from the US. Singapore is concerned with its access to regional markets, freedom on the seas, and worldwide economic strength. The US is fundamental to Singapore's plan of defense development. The US and Singapore collaborated on Indonesian issues involving economies and local politics. "Singapore hosts the US Navy Logistics Group West Pacific and the USAF 497th Combat Training Squadron, and is constructing birthing facilities to accommodate US aircraft carriers."[10] Singapore allocates 6 percent of its GDP to defense expenditures. The country has a very accomplished modern-day military force through its heavy monetary investments.[11]

Singapore desires a continuing favorable balance-of-power situation with the United States, but it is also concerned with the war against international terrorism. Internal and external security concerns intertwine. "In order to face terrorist threats, there must be coherence in

---

[10] Richard Sokolsky, Angela Rabasa, and C.R. Neu, *The Role of Southeast Asia in U.S. Strategy Toward China* (Santa Monica, CA: RAND, 2000), 35.
[11] See Seng Tan and Amitav Acharya, *Asia-Pacific Security Cooperation: National Interests and Regional Order* (Armonk: East Gate Press, 2004), 36.

the national identity and resolve."[12] The strength and stability comes from a collective sense of Singapore's future. Similar to the other island-states, Singapore must constantly ensure it balances regional stability and extra-regional stability through bilateral and multilateral relationships and agreements.

**Thailand**

Thailand has strong economic and security ties with the Chinese, who have delivered inexpensive army and naval military equipment. The growth in ASEAN countries to include Vietnam, has lessened the strategic foundation for Thailand's security cooperation with China. Like the previous island-states, Thailand is concerned about Chinese goals and military competences in the South China Sea. Thais also worry about Chinese influence in Burma. Thailand has increased its engagement with Vietnam to minimize the need for dependency on China alone.[13] Thailand's military policy has evolved. It has progressed with an emphasis on maritime development, a robust conventional defense improvement, and an updated Royal Thai Air Force (RTAF). The navy remains a priority, but after a 1990s financial crisis, Thailand had to

---

[12] See Seng Tan and Amitav Acharya, *Asia-Pacific Security Cooperation: National Interests and Regional Order* (Armonk: East Gate Press, 2004), 189.

[13] Richard Sokolsky, Angel Rabasa, and C.R. Neu, The Role of Southeast Asia in U.S. Strategy Toward China (Santa Monica: RAND, 2000), 36.

reduce the military budget. “From 1985 to 1998 defense expenditures as a percent of GDP dropped from 5.0 to 1.5 percent.”[14]

Two antithetical approaches have been used by Thailand for security in the past. The first approach contends that regional security should be managed by or be the responsibility of the states in the region. The second strategy prefers to cope with regional security by engaging extra-regional powers. Thailand chose bilateral collective defense with the US in the 1960s after it concluded that SEATO was unreliable. Thailand has been able to transition between collective defense in bilateral relationships and cooperative security with ASEAN through the ARF. The key to this successful management has been Thailand’s flexibility and pragmatism.

**PACOM Initiatives**

PACOM participates in many exercises and engagements with foreign military forces in the Asia Pacific. Since 1996, PACOM participated in more than 20 disaster-relief operations in Japan, South Korea, Philippines, Palau, Indonesia, Thailand, Vietnam, Laos, Burma, India, Madagascar, Sri Lanka, and Guam. Disaster relief can be viewed as a stage-setter for other forms of cooperation; some of it military. Regional nations train together so they can enhance the security of their own region. This engagement promotes burden-sharing between

[14] Tim Huxley and Susan Willett, *Arming East Asia,* Adelphi Paper No. 329 (Oxford: International Institute of Security Studies, 1999), 17.

countries so one country does not have to engage in every aspect of security, overextending national industrial and economic means.

Engagements and exercises help build partnership capacity and trusting respectful relationships. BPC promotes a healthier regional defense industry and strengthens domestic economy. It helps to keep production lines open by sharing the cost of development and production across countries. It gives strategic depth by preserving the highly skilled scientists and engineers in manufacturing infrastructure, who would not be gainfully employed by one country alone. PACOM engages in the following security cooperation and BPC exercises: COBRA GOLD, BALIKATAN, COMMANDO SLING, and CARAT.

COBRA GOLD is a joint/combined exercise with Thailand designed to improve US-Thai combat readiness and joint/combined interoperability. It is a recurring multinational and multiservice exercise hosted annually by the Kingdom of Thailand and developed by the Thai and U.S. militaries. This year's activities included a staff exercise, various senior-leader engagements, a field-training exercise and humanitarian and civic-assistance projects. It was designed to advance regional security by training a robust universal force from nations sharing common goals and security obligations in the Asia-Pacific constituency. Similarly, BALIKATAN is a joint exercise between the Republic of the Philippines and the US to improve combat readiness and interoperability.

COMMANDO SLING was created to help build relations with the people of Singapore and train U.S. Air Force Airmen to serve in a joint, combined-force environment. Airmen are able to observe each other's training, operations, and maintenance processes. As information is shared, best practices are shared between nations to benchmark optimal ways of doing business. Additionally, airmen get the opportunity to fly with Airmen from other nations and learn about their aircraft. They train at Paya Lebar Air Base completing several mock air combat scenarios.[15]

Cooperation Afloat Readiness and Training (CARAT) is a series of bilateral military exercises between the U.S. Navy and the armed forces of Bangladesh, Brunei, Cambodia, Indonesia, Malaysia, Philippines, Singapore, and Thailand. CARAT is designed to improve naval-security capabilities. Additionally, it helps to improve the operational cohesiveness among participating forces. While the training in each phase of CARAT varies based on the shared goals of Indonesia and the U.S., a common theme is the development of maritime security capabilities and increasing interoperability among participants. Skill areas exercised during CARAT include: Maritime Interception Operations; riverine, amphibious, and undersea warfare operations; diving and

[15] Kaleb Snay, "Commando Sling pairs 35 FW with Singapore Airmen," 35FW Public Affairs, 24 April 2012, http://www.misawa.af.mil/news/story.asp?id=123299011 (accessed 19 May 2013)

salvage operations; naval gunnery and maneuvering events; and disaster-response exercises.[16]

**Opportunities for Light Attack**

Based on established precedents of engagement and multilateral security concerns, the light-attack aircraft mission which seems to be the most logical is BPC. Having a light-attack aircraft in ASEAN countries can allow for security among the different islands and coastal waters. COBRA GOLD, COMMANDO SLING, CARAT, and BALIKATAN offer established mediums for US airmen to build partnership capacity in the light-attack mission sets.

ASEAN states can show collective power projection in the South China Sea and around the contested Spratly Islands by working with regional and external countries. Additionally, by having a shared light-attack knowledge pool, individual island-state countries can cooperate on the equally important internal security issues through Counterdrug, SAR, ISR, HS, CT, CAS, PR, FAC, AE, and Stability Operations missions. Light-attack aircraft can give a large return against smaller investments to countries like Indonesia, which cannot afford large traditional military forces. By working together, these countries can distribute costs through

[16]Sandra Arnold, "CARAT Exercise Underway in Indonesia," Cooperation Afloat Training and Readiness Public Affairs ,29 May 2012, http://www.cpf.navy.mil/news.aspx/000871 (accessed 19 May 2013)

their defensive industries while simultaneously showing collective resolve against commonly shared internal security issues.

In order for light-attack aircraft to be used in theater, they must either traverse the vast distances of the Pacific, be shipped in by sea, or be flown in by heavy mobility aircraft to predetermined bases in the region. Additionally, austere airfields must be used throughout the region and across multiple islands to base light-attack aircraft forward, allowing for faster response times from austere airfields, similar to the employment in South Vietnam. As a notional example, the Indonesian Air Force can decrease its ground logistical footprint while increasing situational awareness of outlying areas through the use of coordinated airpower.

BPC is the overarching mission, but it simply acts as an umbrella training mission for which all the other previously described missions fall. In other words, air advisors will advise ISR, CAS, and COIN missions, working shoulder-to-shoulder with host nation partners. However, one mission is not necessarily more important than another. Each situation will be case-specific and depend on the desires of the engaged country. Light-attack aircraft contribute to internal security and FID by creating a host nation which can ultimately handle its own security issues without depending on outside assistance. It benefits the US to stay engaged for future access and intelligence, but the ultimate

goal is for a country to align with US international goals while managing its own internal security concerns.

BPC can and does occur through such assets as C-130s and F-16s. However, these assets are expensive compared to light-lift and light-attack assets. Singapore and Thailand are able to engage with these higher technologies, but the US is unable to sustain an engagement for long periods of time due to maintenance, fuel, and logistics costs. Whereas a C-130 might economically engage for two weeks, a light-lift aircraft can sustain a much longer engagement with more sorties for the same cost. Sustained engagement over time increases the exchange of information and growth of trust, which defines a truly effective advisory relationship. These lessons were emerged from the Vietnam legacy and still apply today. In order for airpower to be used effectively in an advisory capacity, it must be cost-efficient and compatible with host-nation capabilities.

## Chapter 6

## Technology, Organization, and Training (TOT)

> *Any fool can make things bigger, more complex, and more violent. It takes a touch of genius-and a lot of courage-to move in the opposite direction.*
>
> *Albert Einstein*

The purpose of this section is to provide a solution space which considers abbreviated concerns from doctrine, organization, training, materiel, leadership and education, personnel and facilities (DOTMLPF). It is not intended to be a full concept of operations, but it is intended to provoke further dialogue and thought on feasible opportunities for the US. It recommends areas to be considered in technology acquisition for particular light-attack aircraft variants, organizations to exercise operational control over these assets, and the training pipeline to maximize return on investment.

First, we will discuss multiple light-attack technologies with regard to strengths and weaknesses in the targeted BPC mission sets. There is no one-size-fits-all solution in light attack. During the LAAR program for Afghanistan, some specifications for the aircraft kept legitimate contenders from being considered which may have been a better choice for the Afghans and the COIN mission. Second, we will examine notional organizational structures at home and abroad that give the light-attack mission a good chance for success and staying power. Without a

motivated organization with its own designated resources and personnel for top cover, it is unlikely the light attack BPC mission will last very long against other more established constituencies in a resource-constrained, highly bureaucratic defense organization. There is too much money and prestige at stake to assume a low-tech program will survive without an autonomous support group that has its own roots. Lastly, a few hypothetical training programs will be described which take a pilot from high school, to flight school, to mission-capable. In order to optimize the bang-for-buck received from light-attack aircraft, the training pipeline must be streamlined and maximize available synergies. There are many conceivable ways to implement a light-attack capability, but these appear to be the most fruitful based on historical patterns and the current characteristics of the USAF.

## Technology

In order to find the right technology for BPC in light attack, one has first to consider the desired capabilities against feasibility and cost for countries involved. For example, the Indonesians might want F-16s, but they cannot afford to purchase and maintain them at this time due to investments in other areas, such as personnel sustainment. Additionally, they do not have the resident fighter knowledge to build upon. They need more of a starter vehicle to develop their TTPs and processes. Another important consideration is familiarity.

In Afghanistan, local pilots preferred Russian technology, because they had been trained by the Russians to operate, supply, and maintain Russian aircraft in the 1980s. Lastly, there is no one-size-fits-all aircraft, and the strength of a light-attack system is that it can be customized to suit the needs of the end user. Some general considerations under review are speed, loiter time, lifecycle costs, armament, EO/IR sensor options, range, and mission flexibility. The following aircraft will be analyzed individually and evaluated against each other for strengths and weaknesses: A-29, AC-208, MQ-9, AT-6, and AT-802U.

The A-29 is a low-wing turboprop aircraft, similar to a WWII fighter, manufactured by Embraer. It cruises at 281knots, has a reported maximum endurance of 8 hours and 40 minutes, and a range of 720 nm. The cost per aircraft is approximately 10 million dollars.[1] The Super Tucano has a wide array of ordnance, which can be hung from five hard points with a 3300 pound capacity. It utilizes the AN/AAQ-22 Star SAFIRE II for Forward Looking Infrared (FLIR). It is highly configurable for great mission flexibility, has a small physical and logistical footprint, and short runway capability, significantly increasing its basing options. The USAF recently chose the A-29 for its LAS program to train Afghan pilots.[2]

---

[1] Fred George, "Pilot Report On Hawker Beechcraft AT-6B," *Aviation Week and Space Technology*, 26 July 2010, 59.
[2] Stephen Pope, "Embraer Wins USAF Rematch with Beechcraft," *Flying*, 01 March 2013,

The AC-208 is more like a small transport, multi-purpose aircraft, which cruises at 175 knots. The cost per aircraft is 1.9 million dollars, and it has a range of 862 nautical miles. The cabin of the aircraft is unpressurized, but it is capable of supporting 17 oxygen ports for aircrew and passengers. The U.S. military currently uses the Caravan for BPC and FID missions in Iraq.[3] This model is known as the U-27A, and it is able to carry and employ AGM-114 Hellfire missiles. In addition to basic light-attack mission profiles, this aircraft has the additional capability to conduct CASEVAC, air assault, and resupply for forward deployed ground troops.[4]

The MQ-9 is a remotely piloted aircraft (RPA), which cruises at 200 knots. It has a range of 1000 nautical miles. The MQ-9 costs $56.5 million (includes four aircraft with sensors, ground control station and Predator Primary satellite link). It can carry armament combination of AGM-114 Hellfire missiles, GBU-12 Paveway II, and GBU-38 Joint Direct Attack Munitions. It uses the Multi-spectral Targeting System, or MTS-B, which combines an infrared sensor, a daylight TV camera, an image-

---

http://www.flyingmag.com/aircraft/turboprops/embraer-wins-usaf-rematch-beechcraft (accessed 19 May 2013).

[3] USAF Public Affairs Office, "Iraqi airmen score bull's eye with Hellfire Missile," American Forces Press Service, 12 November 2009, http://www.af.mil/news/story.asp?id=123177344 (accessed 19 May 2013).

[4] Cessna Aircraft Company, "Grand Caravan Specification and Description," 2010, http://textron.vo.llnwd.net/o25/CES/cessna_aircraft_docs/caravan/grandcaravan/grandcaravan_s&d.pdf (accessed 19 May 2013)

intensified TV camera, a laser designator and a laser illuminator for targeting. Reapers have strong mission flexibility and can perform ISR, CAS, CSAR, precision strike, AE, target development, and terminal air guidance.[5] Reapers have a relatively small physical footprint, but can carry a large logistical footprint for takeoff and landing operations. Crosswind limitations, susceptibility to jamming, inability to perform rough-field landings, and a need for a "cueing source" are additional limiting factors which should be considered in mission-suitability assessments.

The AT-6 can cruise at 270 knots, and it has a maximum self-deployment range of 1350 nautical miles. The basic aircraft cost is approximately 10 million dollars.[6] The aircraft can carry a variety of ordnance including a .50 Cal machine gun pod, 2.75-Inch Rockets, 250/500 lb General-Purpose Bombs, 250 lb Laser-Guided Bombs, 250/500lb Inertially-Aided Munitions, and the AGM-114 Hellfire. With regard to targeting and surveillance, the AT-6 employs the L-3 WESCAM MX-15Di, which has a Color daylight sensor with zoom, Infrared camera with zoom, and Laser designator/rangefinder. The AT-6 has a small physical and logistical footprint. A unique consideration to the AT-6 is that the airframe is already used to train the USAF and USN UPT pilots.

---

[5] Air Combat Command, "MQ-9 Reaper," Public Affairs Office, http://www.af.mil/information/factsheets/factsheet.asp?id=6405 (accessed 19 May 2013)

[6] Fred George, "Pilot Report On Hawker Beechcraft AT-6B," *Aviation Week and Space Technology*, 26 July 2010, 59

This means that it is possible to decrease some of the spin-up time and negative habit transfer while completing mission qualifications.

The AT-802U is a "crop-duster" which cruises at 210 knots, and it has a range of 1300 nautical miles. [7] Its civilian version has demonstrated a robust capability for short field landings on rough terrain. The Air Tractor is comparatively inexpensive to the other mainstream light-attack aircraft around 2 million dollars, but it has possible uses in countries which do not require retractable gear and ejection seats. It is not necessarily as maneuverable or capable, but it can give entry-level performance to support ground troops in light-attack mission sets.

In addition there are other considerations for technological requirements, including aircraft availability, standardized ordnance, and high-tech versus low-tech. When countries are looking for air advisors in a BPC role, it helps to have matching equipment and operators. As previously stated, Indonesia recently acquired Super Tucanos, so the Air Force would be more credible in BPC if it actually had pilots with A-29 flight time. Standardized ordnance is important for acquisition. If the aircraft uses American or NATO standard munitions, it will be much easier to provision operational and training needs.

---

[7] CAV Aviation, "802u-Specs," *Air Tractor Military Dealer*, 13 July 2010, http://cavaviation.com/uploads/2010/07/802U-Specs.pdf (accessed 19 May 2013).

Finally, high-tech aircraft require high-tech training, maintenance, and logistics. For example, the Russians trained farmers and other laymen to work on Afghan helicopters. Part of the attraction of Russian technology in the Mi-17 helicopter is that it can be maintained by people without a high school education. Lots of grease and big bolts can go a long ways towards aircraft mission-capable rates. High-tech machines require a very technical maintenance suite and demand skilled maintainers. Cost usually follows skill.

The following evaluation of these light-attack platforms is admittedly subjective, but is consistent with a BPC mission which can have a broad range of customers with different economic backgrounds and technical preferences in mission selection. The A-29 is a proven performer with mid-range loiter time, but it may be too high-tech for some countries to afford and maintain. The Air Tractor provides a great deal of economy with low-tech systems, but it has fixed landing gear, slow transition times, and a lower service ceiling than most. The AC-208 has limited ordnance delivery, but it is able to airlift food, personnel, and supplies, unlike any other aircraft, at a fraction of the cost. The MQ-9 has a long loiter time, but its munitions are limited in selection and reattack times are slow without a mounted machine gun. Additionally, it is unlikely the US will share its RPA technology with many HN countries. The AT-6 has an ejection seat and a common US fighter cockpit layout, but it is unproven in combat and the assembly line would have to be

created which would take time. The A-29 and AT-6 offer the best chance for immediate engagement due to the availability and low cost of these aircraft. Additionally, Indonesia has recently acquired the A-29 and the Philippines are looking to replace their OV-10s with an aircraft similar to the A-29.

The AT-6, on the other hand, is manufactured in the US, as opposed to A-29 in Brazil. Equipping a USAF squadron with off-shore technology poses almost certain political hazard. The optimal aircraft should serve as both an advanced aircrew trainer and a fully operational light-attack aircraft. The Super Tucano did not win the Joint Primary Aircraft Training System (JPATS) competition, and was eliminated by the USAF primarily due to its poor flying qualities. The competition was won by Beechcraft's T-6 training aircraft upon which the AT-6 draws its heritage. The T-6's 2.1 million flying hours and excellent safety record speak to its capabilities to perform as an advanced trainer. Due to these reasons, the best choice for a USAF squadron is the AT-6.

## Organization

This section will focus on three different organizational models for a native US capability in light attack. The first involves a mixed squadron which reports directly to a higher headquarters such as Secretary of the Air Force/International Affairs (SAF/IA) or PACAF. The second encompasses a more centralized approach under the Air Force Special

Operations Air Warfare Center (AFSOAWC). The last option orbits around the business model of franchising.

The first model assumes a mixed squadron which reports directly to PACAF or SAF/IA. The mixed squadron is modeled after the Marine Corps light-attack squadron in which the operations, maintenance, and logistics fall under one squadron. It falls directly under SAF/IA and PACAF because this allows it to be mobile and move from country to country in a particular AOR or around the world as needed. PACAF would benefit from an advisory squadron to complement PACOM JCS exercises which currently do not have a large air power constituency. SAF/IA is very familiar with FMS, BPC, and the interagency, but it has limited experience in operations and training.

Both entities have the clout to ensure the advisor squadron has staying power against outside naysaying or resource competitors. SAF/IA is more aligned in that its primary mission is BPC, but it does not have a great deal of experience in organizing, training, and equipping an operational light-attack squadron. PACAF has more experience with the operations, but it is unclear how much priority light-attack BPC will have when partnership has gone out of vogue and traditional programs need money and manning.

The second notional model encompasses a more centralized approach which could be pursued under the AFSOAWC. Initially called the Special Air Warfare Center, in 1962 the Air Force chief of staff Gen

Curtis E. LeMay created the Special Air Warfare Center (SAWC). It was the Air Force's response to Secretary of Defense Robert McNamara's call to do more in counterinsurgency. The SAWC absorbed the men and equipment of the 4400th CCTS previously discussed. Most importantly, the center changed 4400th CCTS's mission from developing a unilateral capability to assisting others in developing an indigenous capability to conduct COIN aerial operations.

In this model, the AFSOAWC has its own facilities, syllabi, training personnel, courseware developers, and even an airfield. It could build the syllabi and train countries for light attack BPC from Duke Field, FL. It has the firing ranges and ramp space to accommodate a Light Attack Advisor Squadron. It also has the 6th SOS which advises in the C-145 Skytruck in mostly non-kinetic mission sets. The benefit of AFSOAWC is that it has the resident knowledge and facilities to train other countries.

The last proposed organization model is the out-sourced franchise option. This path requires the least amount of Air Force commitment in money and personnel, but it also decreases the amount of total control and oversight on the BPC program. In this situation, the US allows contractors and industry to sell aircraft through FMS and corresponding BPC training services to expand the HN air power capability. The Air Force then puts its brand on the HN through annual inspections of the program and unit similar to an ORI. If they pass inspection, the Air Force

brands them with a certain level of standardized international interoperability. This country has been certified to do such and such a mission. The private US company or contractor is effectively a franchise which is signed off by the USAF. This allows incentives for corporate ventures, but the HN country still gets the prestige and certification of standards by the US. Costs could find a balance between the profit motive of private companies and the efficiencies afforded by market competition.

Whichever organizational structure is chosen, it is important to ensure the light-attack advisor pilot and the US leadership is in continual engagement with the HN partner. It is essential to know what current issues the HN is concerned about. In order to build trust, the HN partner must feel we have their best interests in mind. Otherwise, it will appear as though an unwanted outside agenda is being pushed. Therefore, being embedded in the country is great, but sharing living and working spaces is ideal.

The Air Force demonstrated this concept with a program called the Thunder Lab in Afghanistan. In this program, the Afghan pilots shared the same living quarters as USAF advisors. This allowed the allied mentors the opportunity to conduct teambuilding exercises, physical fitness, and even share leisure time with the Afghan pilots. This had three distinct outcomes. First, the Afghans built lasting friendships based in trust with the allied mentors. Second, the work ethic of the

advisors was observed the emulated by the Afghan trainees. Finally, the Afghans ability to speak English and pick up on complex tasks increased exponentially. In order for BPC to work as designed, the organization has to be engaged to the max extent with HN partners.

Based on these considerations, an AFSOC squadron is the most logical organization for native US light-attack capability and training. A squadron under SAF/IA would not have the operational experience and focus. Additionally, the franchise option would require some time to recruit the appropriate contractor talent, and it would be much more difficult to align security concerns with corporate interests. An AFSOC squadron at Duke Airfield, FL, would also be the best organizational solution and fit for housing the AT-6 under the AFSOAWC. Host-nation countries could train in Florida or the squadron could provide a tailored light-attack program for export.

**Training**

In the traditional USAF pilot training pipeline, officers can undergo 1.5 to 2 years of pilot training, switching from aircraft to aircraft, before they are fully mission qualified. This process is lengthy with respect to time and quite costly in operations, maintenance, and logistics. Additionally, negative habit transfer can occur when changing from aircraft to aircraft. Old techniques have to be unlearned when changing to new systems, and maintenance and parts have to be available for all the different aircraft variants. For the light-attack mission, a highly

customized training program can take a student from basic training to flight school to mission-ready in substantially less time and for less money. Additionally, this same training model will be replicated for BPC with HN countries, so there is one syllabus for all US and foreign trainees. This allows for simplicity in execution and prestige in knowing the system is the same for Americans and allied partners.

The light attack BPC mission covers a fairly broad range of skill sets, but it also has the luxury of being conducted in a two-seat aircraft which can serve dual roles in operations and training. This allows a squadron to accept basic mission-qualified co-pilots (CP) who can gain experience in the squadron and then upgrade to a fully qualified aircraft commander (AC) within the squadron. The co-pilot can gainfully contribute as a sensor operator while learning under the mentorship of the aircraft commander during real-world scenarios. This flexible methodology also decreases costs associated with temporary duty (TDY) assignments for mission upgrades to AC and instructor pilot (IP).

The content of training will look very similar to traditional methods up to the USAF UPT track selection. Normally, after track selection, pilots change aircraft depending upon their final specialty. For example, helicopter pilots go to UH-1s at Fort Rucker, heavy pilots go to T-1s, fighter pilots transition to T-38s, and C-130 pilots transition to T-44s. Then they all transition one more time at least for their final aircraft. Provided the light-attack aircraft was an AT-6 or A-29, light-attack pilots

would stay in the same aircraft all along, and they would track to mission-specific training to become a mission qualified CP. Track select usually occurs about six months into traditional training, and pilots are qualified to conduct basic visual flight rules (VFR) operations, instrument flight rules (IFR) operations, emergency procedures, low-level flight and two-ship formation flight by this stage.

Once track selection occurs, the light-attack pilot would be informed about his geographical region of expertise. This notification determines what type of language and culture ground academics the pilot will receive in addition to mission-specific training. During the next six months of flying, the light-attack pilot would also learn basic weapons switchology, sensor operations, tactical formations, SAR, and ground attack. From these fundamental building blocks, the pilot can upgrade in the gaining squadron in areas such as FAC(A), CAS, Counterdrug, ISR, HS, CT, and AE. These certifications can be signed off on real-world missions, or they can be simulated in continuation training flights with an IP. This system creates the additional benefit of familiarizing the pilot in the area where he will geographically specialize, and the training can be tailored to local considerations.

The last part of light attack training prior to CP arrival at a gaining squadron is dedicated to familiarity with the other players in BPC. In order to be effective, pilots can expect to have multiple interactions with other players from the interagency and especially the State Department.

There are likely times when an embassy and its FSOs are the only other Americans in country. To bridge this gap, BPC pilots will also undergo a primer in the FSO A-100 basic course.

A-100 is the informal name given to the orientation training class for incoming FSOs. Classes are taught in the Foreign Service Institute at the National Foreign Affairs Training Center in Arlington, Virginia. The class provides orientation to the United States Department of State, information on embassy operation and foreign affairs, intelligence collection and dissemination, State Department computer systems, and the roles different categories of personnel perform in the conduct of diplomacy.[8] In order for a BPC pilot to be effective, he must work well with the other players from the HN country and from the US interagency. This is why the additional language and culture training is a force multiplier when combined with the A-100 training.

This syllabus will be used to train the initial US and HN IP cadre. Once in place, US IPs can train and operate with HN pilots and vice versa within the operational squadron downrange. In a notional scenario, the Philippines, Indonesia, and Singapore want to work with the US to create a multilateral light attack partnership for SAR, ISR, CT, and AE of maritime convoys. All decision makers agree to establish the advisory squadron in Singapore.

---

[8] Kathryn Viguerie, *A Guide to the Foreign Service for those New to the Foreign Service* (Washington, DC: Department of State, 2011), 3.

The 497th Combat Training Squadron (CTS) is located at Paya Lebar AB, Singapore, as a result of an agreement signed in November 1990 between the Government of the United States and the Government of Singapore.[9] This agreement allows for the periodic deployments of US fighter aircraft and the permanent presence of US forces. The 1st Light Attack Advisory Squadron (LAAS) could establish a tenant unit agreement with host support from the 497th CTS. The unit would have the requisite manning and material to support eight aircraft. In this case, the Super Tucano is chosen because Indonesia recently purchased these aircraft and the US also has familiarity from advising in Afghanistan. This squadron would consist of organic pilots, maintainers, logisticians, and linguists for the represented countries.

The initial cadre IPs from all the involved countries undergo training using the established syllabus. Once all IPs are signed off by their respective leadership, the training for the first pipeline students begins. Once these students are trained, they are fully qualified CPs and can help in flying operational sorties upon request. When the CPs reach operational maturity, they can recycle into the training pipeline at Singapore to train the next generation of light attack pilots. Eventually, the Philippines, Singapore, Indonesia, and the US all have pilots who

---

[9] Commander, Navy Installations Command, "NRCS-Tenant Commands-497th Combat Training Squadron," CNIC,19 May 2013, http://www.defense.gov/news/newsarticle.aspx?id=119302 (accessed 19 May 2013http://www.cnic.navy.mil/Singapore/AboutUs/TenantCommands/497thCombatTrainingSquadron/index.htm (accessed 19 May 2013)

rotate through the training squadron at Singapore as well as the operational squadrons located downrange in the affected countries. If the model is successful for both military and diplomatic means as suggested, it can be replicated throughout other parts of the Asia-Pacific region.

Lastly, the type of US and HN candidates selected for the light attack BPC mission is critical. This mission requires the right kind of temperament as the operating environment can feel like the "Wild West" at times. This is due to the differing norms in culture and general way of doing business by an HN military. It is not right or wrong, but it will assuredly be different from the USAF schoolhouse way of operations. US pilots must be emotionally thick-skinned and culturally tactful, and they must be trained to this standard.

For HN selection criteria, the ideal candidate is young, motivated, honest, physically fit, and speaks English. Experience in advising and operating with Afghan pilots provides rationale for these considerations. First, a HN pilot should be young because he does not have bad habit transfer which must be unlearned. In Afghanistan, the pilots were resistant to change after they had been flying a certain way for 20 years, so this made interoperability difficult with NATO allies. It is hard to explain the importance of briefing, crew resource management (CRM), checking the weather, and debriefing to someone who has never accomplished these tasks. Second, the candidate should be motivated and physically fit, because the task is mentally and physically difficult

and will require extra effort due to the plethora of light-attack mission sets. Finally, an ideal candidate speaks English. English is the international language for aviation, so interoperability with international partners in the future will be much smoother and safe. However, speaking English is not a hard-and-fast requirement, and this is why the US pilot undergoes language and culture training in his evolution to become an operational CP. Also, it helps to earn trust when you can speak the HN language and respect its cultural norms.

The training options mentioned here could be considered too radical for the current Air Force system. For the current system, a more typical approach to pilot training is recommended to train a light-attack squadron. A nominal syllabus would include a traditional track through T-38s followed by a topoff syllabus in T-44s at Corpus Christi, TX. This would allow the pilots to alternate tours in operational and advisory tours without completely disregarding career progression.

Finally, due to the recent budget issues caused by sequestration, the Air Force may decrease the total numbers of F-35s purchased and the pilots needed for those aircraft. If this situation is unavoidable, these pilots would be perfect candidates to cross-flow into the light-attack program. Field grade officers could join the RAS/PAS career field. Upon completion of a light attack tour, the officer could complete a follow on tour in an embassy or on the staff in SAF/IA. This would provide the initial cadre of experienced attack pilots and the upper level leadership of

a light-attack squadron. One RAS/PAS tour could broaden the officer's perspective of the interagency without completely alienating her from the typical fighter pilot career path.

## Chapter 7

## Costs/Conclusions/Recommendations

How can the United States incorporate light attack options in the Asia Pacific region to increase security, and why should it even try? Is BPC in the best interest of national security, and what is the USAF willing to pay for an aviation representation? If the Air Force believes it can muddle through this kind of war and HN engagement with its high-tech assets, it will not make investments in light-attack aircraft. Therefore, high-end aircraft will be the only future option. These aircraft operate at costs which dwarf those of light-attack units. This cost disparity is a lure for anyone who means to level the playing field with a super power through guerilla tactics or by sponsoring proxy wars.

Since 2001, Air Force fighter aircraft have flown combat sorties with abnormally high flight durations while participating in Operations Iraqi Freedom and Enduring Freedom. These longer sortie durations have added previously unanticipated flight time to aging airframes, thereby reducing the expected service life of the Air Force‘s legacy fighter fleet. Some critics have claimed the Air Force cannot afford to make the initial upfront investment in light-attack aircraft due to budget considerations. However, the following results from a Joint Air-Ground Combat Division (ACC/A3D) cost comparison show how maintenance and fuel costs will validate the upfront investments in light-attack acquisitions within a year:

> Capability aside, the OA-X has a credible business case behind it. The effect provided by OA-X is similar to what the joint force air component commander (JFACC) is providing with the legacy fleet—only for much less in terms of fuel consumed, airframe life, and maintenance costs. For a comparison, we examined one Air Expeditionary Task Force (AETF 1) consisting of a squadron of F-16s and half a squadron of F-15Es flying 36 four-hour air refueled sorties per day (24 for the F-16, 12 for the F- 15E). For the OA-X, AETF 2 consisting of two 18-PAA squadrons of OA-X, also flying 36 four-hour sorties per day, but with no air refueling. In a nutshell, AETF 1 has a daily fuel requirement of 636,000 pounds at the base, plus roughly 420,000 pounds of tanker-delivered fuel, requiring six tankers which burn 160,000 pounds themselves. The total: 1,216,000 pounds of fuel per day, or over 65 million gallons per year. AETF 2 requires 60,000 pounds from the base per day or 3.2 million gallons per year with no tanker support at all.[1]
>
> According to preliminary estimates by OSD Program Analysis and Evaluation (PA&E) and the Institute for Defense Analyses (IDA) the cost of delivering fuel to battle begins at around $15 per gallon and increases the deeper into the battlespace the fuel moves, assuming no force protection requirements for the supply convoys. Fuel delivered in-flight has been estimated to be on the order of $42 per gallon.[2]

In Table 1 below, the cost per flying hour for a sampling of aircraft has been included for reference. This data was acquired from the Secretary of the Air Forces Financial Management section in the A4-1 Logistics Costs Factors spreadsheet for Fiscal Year 2013.

---

[1] Michael Pietrucha and David Torres-LaBoy, "Making the Case for the OA-XLight Attack Aircraft," *Air Land Sea Bulletin* (January 2010), 18.
[2] Office of Under Secretary of Defense for Acquisition, Technology, and Logistics, *Report of the Defense Science Board Task Force on DoD Energy Strategy: More Fight—Less Fuel*, (February 2008), 28.

Table 1. A4-1 Flying Hour Costs Author's Original Work

| MDS | AVPOL(699) | GPC(619) | GSD(605) | MSD(644) | 4-3CPFH(Engine) | 5-2CPFH(CLS) | TotalFHCosts |
|---|---|---|---|---|---|---|---|
| A-10A | $2,333 | $48 | $853 | $3,431 | $73 | $0 | $6,738 |
| A-10C | $2,238 | $35 | $909 | $3,381 | $73 | $0 | $6,636 |
| B-1B | $14,253 | $74 | $2,762 | $26,000 | $1,401 | $0 | $44,490 |
| B-2A | $7,999 | $183 | $1,501 | $18,752 | $3,586 | $0 | $32,021 |
| B-52H | $13,320 | $180 | $1,397 | $6,919 | $3,462 | $0 | $25,278 |
| F-15C | $6,441 | $50 | $1,456 | $8,104 | $248 | $0 | $16,299 |
| F-15D | $6,511 | $49 | $1,468 | $8,140 | $248 | $0 | $16,416 |
| F-15E | $7,293 | $41 | $1,361 | $8,600 | $162 | $0 | $17,457 |
| F-16C | $3,311 | $41 | $960 | $4,177 | $555 | $0 | $9,044 |
| F-16D | $3,316 | $39 | $974 | $4,201 | $555 | $0 | $9,085 |
| F-22A | $6,927 | $109 | $287 | $18 | $2 | $14,517 | $21,860 |
| MQ-9A | $75 | $0 | $0 | $0 | $0 | $1,067 | $1,142 |
| T-6A | $244 | $3 | $17 | $0 | $0 | $210 | $474 |

The following table uses fuel and flight-hour costs to show how light-attack aircraft operate at 5.5% of fighter cost. A low $7,000 per flight hour cost average for KC-135s was used compared to a very high estimate of $1,500 per hour for the AT-6. Some conservative estimates have light-attack aircraft performing at $750 per flight hour.

| | | Table 2 Cost Comparison | | | |
|---|---|---|---|---|---|
| | Lbs/Day | Gallons/Day | Cost/Gallon | Cost/Day | Fuel Cost/Year |
| Fighters Base Fuel | 636000 | 93529.41176 | 15 | 1402941.2 | $512,073,529.41 |
| Tanker Base Fuel | 160000 | 23529.41176 | 15 | 352941.18 | $128,823,529.41 |
| Tanker Delivered Fuel | 420000 | 61764.70588 | 42 | 2594117.6 | $946,852,941.18 |
| | | | | | **$1,587,750,000.00** |
| | | | | | |
| OA-X Fuel | 60000 | 8823.529412 | 15 | 132352.94 | **$48,308,823.53** |
| | | | | | |
| Flying Hour s | FH/Day | FH Cost/Hr | FH Cost/Day | | FH Cost/Year |
| 24 F-16D | 96 | $9,085 | $872,160 | | $318,338,400 |
| 12 F-15E | 48 | $17,457 | $837,936 | | $305,846,640 |
| 6 KC-135 | 48 | $7,000 | $336,000 | | $122,640,000 |
| | | *Using Low Estimate for KC-135 | | | **$746,825,040** |
| | | | | | |
| | | *Using Highest Estimate for T-6 | | | |
| 36 Light Attack | 144 | $1,500.00 | $216,000.00 | | **$78,840,000.00** |
| | | | | | |
| Total Costs | Fuel | Maintenance | Total | | |
| Fighters | $1,587,750,000.00 | $746,825,040 | **$2,334,575,040.00** | | |
| | $48,308,823.53 | $78,840,000.00 | **$127,148,823.53** | | |
| | | Difference | **$2,207,426,216.47** | | |
| | | | | | |
| | Ratio | 0.05446337 | **Light-Attack 5.5 Percent of Fighter Cost** | | |

In one year, the notional savings could be as much as 2.2 billion dollars. This cost savings would dwarf the concerns about the initial acquisition price. The so-called "Long War" against global terrorism takes time as its name suggests, and the US might price itself out of effectiveness in low-intensity conflict. According to an Air Combat Command (ACC) budget planner, for FY15 ACC is roughly $500M in the red to do what leaders project as necessary. The Air Force Office of Financial Management sent guidance for FY13 to look at a top-line reduction, and ACC was already so over-extended in FY13 that it was counting on $200-400M in headquarters assistance just to get through (and spending as if it was going to get it). In addition, it appeared that

overseas contingency operations (OCO) funds would not come through as forecast, and since ACC's first priority was the war, it needed to find another $600M in the command to pay OCO from its baseline.

As in O&M, the AF is over-extended in bases, forces, and modernization/acquisition programs. In order to win a theater-level major combat operations (MCO) war, ACC needs the F-35. As a hedge until it fields, the command needs to keep current fighters like the F-16 viable, which were used up executing missions tailor-made for light-attack aircraft. ACC does not have the money to do either. Manpower is another major problem. The message is that ACC does not have the manpower to field LAAR in any useful manner. The AF must get smaller and shed missions if it is going to get within budget. LAAR was number one on list of things to cut. So, the Air Force does not have enough money for light attack aircraft, because it has to pay for F-35s, which it will be unable to afford later when F-35s are doing the same mission F-16s and other 3rd generation aircraft are doing today.

The only way this logic works is if the Air Force can say it will not participate in long, low-intensity conflicts in the future, or BPC with nations who cannot afford 4th-generation fighters. A clear strategic vision based on national security interests is required, not a service-norm-serving scenario without statistical empirical evidence. The Air Sea Battle and penetrating strategy helps to justify big purchases on high-end equipment, but are they actually probable? Are the Chinese willing to go

the distance with a nuclear super power? Or is it much more likely that the US will be engaging countries across the region in power-balancing tactics. A clear military strategy should have staying power that transcends the current political revolving door.

While the Indo-Asia-Pacific region today is at relative peace, we remain concerned as we see stress points in territorial disputes and the threat that North Korea presents to the peace and security of the region. However, the credible and persistent commitment of the U.S. to the region through robust presence and partnerships has created, and will continue to provide, an enduring, prosperous, and stable security environment for the region.

Fundamental to the rebalancing strategy is that USPACOM actions align and synchronize with the diplomacy, policy, economic, and confidence-building measures of our U.S. government partners. These coordinated efforts demonstrate an enduring resolve to show commitment to the Indo-Asia-Pacific region across all facets of engagement. USPACOM remains focused as the military component of this commitment, and we will continue to plan and conduct operations, actions, and activities that support this holistic governmental approach in building upon the peace and prosperity of the region.

The posturing and forward presence of our military forces are key to USPACOM's ability to rapidly respond to any crisis or disaster. Due to the vast distances involved in our area of responsibility, it is imperative

we continue to receive the support provided by our partners in the Services and through the Congress to maintain the readiness of our forward deployed forces. PACOM manages the rebalance along four lines of operations that form the bedrock of our strategy. Those four lines of operations are: (1) strengthening alliances and partnerships, (2) improving posture and presence, (3) developing capabilities and concepts, and (4) planning for operations and contingencies.

Strengthening alliances and partnerships is the number one priority for the PACOM commander. Recently, other high-ranking General officers have touted the importance of HN BPC. General Lloyd Austin, CENTCOM commander, said, "the years since 9/11 have demonstrated that agencies responsible for elements of national power - military, economic and diplomatic – must work together."[3] He said he has worked closely with senior military and civilian officials across government, and with partner nations' government and military leaders. "I can personally attest to the effectiveness of these kinds of collaborations," he said. "If confirmed, I will continue to cultivate my existing relationships, while pursuing additional opportunities and partnerships that will surely prove beneficial to our efforts."[4] General David Rodriguez said in a brief

---

[3] Karen Parrish, "Centcom, Africom Nominees Tout Importance of Partnerships," *American Forces Press Service*,14 February 2013, http://www.defense.gov/news/newsarticle.aspx?id=119302 (accessed 19 May 2013)

[4] Karen Parrish, "Centcom, Africom Nominees Tout Importance of Partnerships," *American Forces Press Service*, 14 February 2013, http://www.defense.gov/news/newsarticle.aspx?id=119302 (accessed 19 May 2013)

opening statement that if confirmed to lead AFRICOM, he will "[work] closely with this committee, as well as all our joint, interagency, intergovernmental and multinational partners to address the challenges we face, and the opportunities to increase stability on this strategically important continent." Strong partnerships are key to that stability."[5]

The SOCOM commander Navy Admiral William McRaven reinforced these statements at the House Armed Services Committee defense authority review. "Our direction here as we push toward a vision for [special operations forces] 2020 is about building partner capacity. While there are a number of authorities that enable the command to engage in numerous joint capability, exercise and training programs, most are only one-year funding authorities," McRaven said. "As you begin to build a partner's capacity, you want … a five-year plan or a 10-year plan because it takes time to build capacity if you want to do it right," he added.

If the Air Force wants to get BPC right, it must also have a 5-10 year plan for HN engagement. Ad hoc arrangements may look good in strategic communications and officer performance reports (OPR), but they produce no tangible results for national security. As in any worthwhile relationship, the investments in HN partners take time and continual attention, not newspaper headlines. Unless propaganda is the

[5] Karen Parrish, "Centcom, Africom Nominees Tout Importance of Partnerships," *American Forces Press Service*, 14 February 2013, http://www.defense.gov/news/newsarticle.aspx?id=119302 (accessed 19 May 2013)

primary aim, BPC must be a constant consideration and priority for the Air Force. It does not have to give up its technology, but it should set aside the right aircraft for the right mission. In places where air superiority is achieved, flying expensive aircraft is not an economical option. By apportioning low-end aircraft to low-end threats and missions, the Air Force can keep its fighter pilots focused on fighting high-end threats and allow low-tech aircraft to maintain those pivotal stability relationships with the interagency, HN, and joint customers on the ground.

**Barriers to Entry**

In the business world, new products and services face a host of challenges before they become common household necessities. In a similar vein, taking the light-attack unit from concept to operations requires a persistently innovative group of talented individuals. The Air Force is a hierarchical and bureaucratic organization. It maintains an organic set of norms and traditions, which define its culture. While this is not a bad thing, this culture must be understood in order for any new idea to have a marginal chance for success.

In 1989, Carl Builder discussed this culture and its effects on the way services accomplish their analysis and shape future strategy.[6] He proposed that institutions have distinct personalities. These personalities govern their behavior, and the services are the most powerful institutions

[6] Carl H. Builder, *The Masks of War: American Military Styles in Strategy and Analysis* (Baltimore, MD: Johns Hopkins University Press, 1989)

in the American national security arena. Builder asserts that the Air Force culture is defined by technology. He goes so far as to say the Air Force worships at the altar of technology.

> The airplane was the instrument that gave birth to independent air forces; the airplane has from its inception, been an expression of the miracles of technology…If the Air Force is to have a future of expanding horizons, it will come from understanding, nurturing, and applying technology.[7]

This love of technology can be a hindrance to light-attack advocates when considered from afar. The platform, when isolated in scope and specifications, is not necessarily a step forward, and may actually be considered as a step backwards in technology. It is slower, less powerful, and it has no stealth capability. This argument might be valid if technology was only concerned with the inanimate object of the airplane. However, technological systems are not developed this way, because the human practitioner has a vote in its evolution. The application of a technology within a socially defined system determines the cumulative progress of the system.

Investing in specific new capabilities may be impulsive, given both the current economic circumstances and the absence of a clear strategy. The US should adopt an alternative solution for instability in the evolving world. It should save the majority of its assets for meeting specific critical priorities. This DOD should leverage its global advantage in highly

---

[7] Carl H. Builder, *The Masks of War: American Military Styles in Strategy and Analysis* (Baltimore, MD: Johns Hopkins University Press, 1989), 19.

trained personnel by highlighting the training, equipping, and advising of native forces of countries threatened by insurrection, especially states confronting radical terrorist groups, rather than direct combat operations.

It all comes down to managing risk in a responsible fashion, and not putting all of the strategic eggs in the high-tech basket. For a long time, the Air Force had to measure its success in speed. Basically, money was not the concern, but results were measured in how quickly a goal could be accomplished. Today, time has become an asset to the enemy, and partners are needed to share the load. We must start with the political goal of the state, and then find the tool to most efficiently accomplish that goal. Do not start with the tool, and then try to find a job to justify the tool. As Abraham Maslow said, "he that is good with a hammer tends to think everything is a nail."

The Air Force should invest in light attack BPC, because there is a genuine need in the island-states of the South China Sea. Indonesia has already purchased the A-29, and that gives the Air Force an opportunity to establish a relationship to maximize partnering and future interoperability. Additionally, the Air Force must consider how it will develop its pilots for such a mission.

Light-attack pilots do not currently exist, so an organization would have to be built which develops these kinds of pilots. Otherwise, a tour in light-attack aircraft would be a career-ending decision. If the Air Force

wants to attract strong pilots, it must create a program which allows promotion through the flag officer ranks. This is also important to ensure good strategic decisions with regard to organization, training, and equipping the Air Force for BPC roles. If the service wishes to have a strong, affordable showing, it must invest in these economical assets. Otherwise, it is likely to price itself out of irregular warfare and, by inference, the Pacific region.

## Bibliography


Air Combat Command, “MQ-9 Reaper,” Public Affairs Office, http://www.af.mil/information/factsheets/factsheet.asp?id=6405 (accessed 19 May 2013).

Alnwick, Kenneth. "Perspectives on Air Power at the Low End of the Conflict Spectrum," *Air University Review* 35, no. 3. March-April 1984.

Arnold, Sandra, “CARAT Exercise Underway in Indonesia,” Cooperation Afloat Training and Readiness Public Affairs ,29 May 2012, http://www.cpf.navy.mil/news.aspx/000871 (accessed 19 May 2013).

Builder, Carl, *The Masks of War: American Military Styles in Strategy and Analysis.* Baltimore, MD: Johns Hopkins University Press, 1989.

Bungay, Stephen *The Most Dangerous Enemy: A History of the Battle of Britain* (London: Aurum Press, 2000).

Burton, James, *The Pentagon Wars: Reformers Challenge the Old Guard*, Annapolis, MD: Naval Institute Press, 1993.

CAV Aviation, “802u-Specs,” Air Tractor Military Dealer, 13 July 2010, http://cavaviation.com/uploads/2010/07/802U-Specs.pdf (accessed 19 May 2013).

Cessna Aircraft Company, “Grand Caravan Specification and Description,” 2010, http://textron.vo.llnwd.net/o25/CES/cessna_aircraft_docs/caravan/grandcaravan/grandcaravan_s&d.pdf (accessed 19 May 2013).

Chin Kin Wah, *The Defense of Malaysia and Singapore: The Transformation of a Security System, 1957-1971*. Cambridge: Cambridge University Press, 1983.

Churchill, Jan, *Hit My Smoke: Forward Air Controllers in Southeast Asia* Manhattan, KS: Sunflower University Press, 1997.

Commander, Navy Installations Command, “NRCS-Tenant Commands-497th Combat Training Squadron,” CNIC,19 May 2013, http://www.defense.gov/news/newsarticle.aspx?id=119302 (accessed 19

May2013http://www.cnic.navy.mil/Singapore/AboutUs/TenantCommands/497thCombatTrainingSquadron/index.htm (accessed 19 May 2013)

Dean, David J., "The USAF in Low-intensity Conflict: The Special Air Warfare Center." *Air University Review* 36, no. 2 (January-February 1985).

Douhet, Giulio. *The Command of the Air.* Tuscaloosa, AL: University of Alabama Press, 2009.

Drew, Dennis M., *Insurgency and Counterinsurgency: American Military Dilemmas and Doctrinal Proposals*. Maxwell AFB, AL.: Air University Press, 1988.

Erhard, Thomas P. *An Air Force Strategy for the Long Haul*. Washington, DC: Center for Strategic and Budgetary Assessments, 2009.

Futrell, Robert F., *The United States Air Force in Southeast Asia: The Advisory Years to 1965*. Washington, DC: Office of Air Force History, 1981.

George, Fred, "Pilot Report On Hawker Beechcraft AT-6B," Aviation Week and Space Technology, 26 July 2010.

Hildreth, Charles H. *USAF Counterinsurgency Doctrines and Capabilities, 1961-1962*. Washington, DC: USAF Historical Division Liaison Office, 1974.

Huxley, Tim, and Susan Willett, *Arming East Asia, Adelphi Papers* Oxford: Oxford University Press, 1999.

Jervis, Robert. *Perception and Misperception in International Politics.* Princeton, NJ: Princeton University Press, 1976.

JP3-26, Joint Publication Counterterrorism, 13 November 2009, III-1.

JP3-26, *Joint Publication Counterterrorism*, 13 November 2009, III-3.

JP 3-29, *Joint Publication Foreign Humanitarian Assistance*, 17 March 2009.

JP 3-22, *Joint Publication Foreign Internal Defense*, 12 July 2010.

JP 3-24, *Joint Publication Counterinsurgency Operations*, 05 October 2009.

JP 3-50, *Joint Publication Personnel Recovery*, 5 January 2007, VI 17.

JP 3-07.3, *Joint Publication Peace Operations*, 17 October 2007.

Khong, Yuen F. *Analogies at War: Korea, Munich, Dien Bien Phu, and the Vietnam Decisions*. Princeton, NK: Princeton University Press, 1992.

Kuhn, Thomas S. *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press, 1962.

Liddell Hart, B.H. *Strategy.* Rev. ed. London: Penguin Press, 1991.

Mackenzie, Eaglen. *What's Likely in New Pentagon Strategy: 2 Theaters, Fewer Bases, A2AD*, Breaking Defense, http://breakingdefense.com/2011/12/20/whats-likely-in-new-pentagon-strategy-2-theaters-fewer-bases/ 20 December 2011, (accessed 19 May 2013).

Monroe, George M., "The Rebirth of the Outback Air Force," *Armed Forces Journal* Feb 08: http://www.armedforcesjournal.com/2008/02/3246746 (accessed 15 May 2013).

Office of Under Secretary of Defense for Acquisition, Technology, and Logistics, Report of the Defense Science Board Task Force on DoD Energy Strategy: More Fight—Less Fuel, (February 2008).

Osinga, Frans. *Science, Strategy and War: The Strategic Theory of John Boyd.* New York: Routledge, 2007.

Overson, Nathaniel, *Before the 6 SOS there was the 4400 CCTS*, 14 April 2009, http://www2.hurlburt.af.mil/news/story.asp?id=123144326 (accessed 19 May 2013).

Pacific Air Forces, *T-28 Operations M-42163-u no.68*. Maxwell AFB, AL: Air University Press, 1967.

Parrish, Karen, “Centcom, Africom Nominees Tout Importance of Partnerships,” American Forces Press Service, 14 February 2013, http://www.defense.gov/news/newsarticle.aspx?id=119302 (accessed 19 May 2013).

Pietrucha, Michael, “Making the Case for the OA-X Light Attack Aircraft,” Air Land Sea Bulletin (January 2010).

Pope, Stephen, “Embraer Wins USAF Rematch with Beechcraft,” *Flying*, 01 March 2013, http://www.flyingmag.com/aircraft/turboprops/embraer-wins-usaf-rematch-beechcraft (accessed 19 May 2013).

See Seng Tan and Amitav Acharya, *Asia-Pacific Security Cooperation: National Interests and Regional Order.* Armonk: East Gate Press, 2004

Sheehan, Neil *A Fiery Peace in a Cold War: Bernard Schriever and the Ultimate Weapon.* New York: Vintage Press, 2009.

Smith, Michael, *Blue Horizons II: Future Capabilities and Technologies for 2030.* Maxwell AFB, AL: Air University Press, 2013.

Snay, Kaleb “Commando Sling pairs 35 FW with Singapore Airmen,” 35FW Public Affairs, 24 April 2012, http://www.misawa.af.mil/news/story.asp?id=123299011 (accessed 19 May 2013)

Sokolsky, Richard, Angela Rabasa, and C.R. Neu, *The Role of Southeast Asia in U.S. Strategy Toward China*. Santa Monica, CA: RAND, 2000

Thorndike, Edward, *The Fundamentals of Learning*. New York: Teachers College Press, 1932.

USAF Public Affairs Office, “Iraqi airmen score bull's eye with Hellfire Missile,” American Forces Press Service, 12 November 2009, http://www.af.mil/news/story.asp?id=123177344 (accessed 19 May 2013).

Viguerie, Kathryn, *A Guide to the Foreign Service for those New to the Foreign Service*. Washington, DC: Department of State, 2011.

Westermann, Edward B., “Relegated to the Back Seat: Farm Gate and the Failure of the US Advisory Effort in South Vietnam, 1961-1963” in *Military Advising and Assistance*, ed, Donald Stoker et al. New York: Routledge Press, 2008.